USDA

United States
Department of
Agriculture

Forest
Service

Pacific
Northwest
Region

January 2006

Tamarack Quarry Expansion Project

Final Environmental Impact Statement

Mt. Hood National Forest

Final
Environmental Impact Statement
for the

Tamarack Quarry Expansion Project
Mt. Hood National Forest

US Department of Agriculture, Forest Service
Mt. Hood National Forest

January 2006

Acronyms and Abbreviations

ACDP	Air Contaminant Discharge Permit
ACS	Aquatic Conservation Strategy
ADT	average daily traffic
AINW	Archaeological Investigations Northwest, Inc.
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CSC	closed small conifer (structure classification)
dbh	diameter at breast height
DEIS	Draft Environmental Impact Statement
DEM	digital elevation model
DEQ	Oregon Department of Environmental Quality
DLC	Donation Land Claim
DOGAMI	Oregon Department of Geology and Mineral Industries
EIS	Environmental Impact Statement
EO	Executive Order
EPA	US Environmental Protection Agency
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FEMAT	Forest Ecosystem Management Assessment Team
FS	USDA Forest Service
GFS	grass/forb/shrub (structure classification)
GIS	geographic information system
GLO	General Land Office
LCDC	Oregon Land Conservation and Development Commission
LRMP	Land and Resource Management Plan
MP	mile post
NEPA	National Environmental Policy Act
NRF	nesting, roosting, and foraging (habitat)
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
OR	Oregon Route
ROD	Record of Decision
RV	recreational vehicle
SHPO	State Historic Preservation Officer
TES	Threatened, Endangered, and Sensitive

US	United States
USC	United States Code
USDA	US Department of Agriculture
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
VQO	Visual Quality Objective

Tamarack Quarry Expansion Project
Final Environmental Impact Statement

Mt. Hood National Forest
Clackamas County, Oregon

Responsible Agency: USDA Forest Service

Responsible Official:
Gary Larson
Forest Supervisor
Mt. Hood National Forest
16400 Champion Way
Sandy, Oregon 97055

For More Information, Contact:
Mike Redmond
Forest Environmental Coordinator
Mt. Hood National Forest
16400 Champion Way
Sandy, OR 97055
(503) 668-1776
mredmond@fs.fed.us

Abstract: This Final Environmental Impact Statement (FEIS) documents the analysis of three alternatives, including the No Action Alternative, developed for the Tamarack Quarry Expansion Project. The purpose of the proposed action is to secure a long-term, economical source of rock material for the USDA Forest Service (FS) and Oregon Department of Transportation (ODOT) to use on highways and forest roads near Mt. Hood.

Rock would be excavated first from the remaining seven acres in the currently permitted area, then from the expansion area. Excavation would occur over the next 20 or more years, as rock is needed. ODOT anticipates removing 40,000 to 90,000 cubic yards of rock per year. The FS would extract 10,000 to 15,000 cubic yards of rock per year for project work other than emergencies. The excavated material would be used by ODOT and the FS for road maintenance and construction, including improvements to US Highway 26 and Oregon Route 35. Activities under all alternatives would include blasting, rock crushing, screening, batching, loading and hauling, importing excess materials for reprocessing or quarry reclamation, and short-term stockpiling of excavated rock and soils. Portions of the quarry may be reclaimed in stages and a copy of this plan is included in this FEIS in Appendix G. No improvements would be made to the haul route (FS roads 2656 and 2656-955) except for routine maintenance.

Alternative 1 would expand the Tamarack Quarry by approximately 41 acres more than the currently permitted 29 acres, for a total area of approximately 70 acres. With Alternative 2, the Tamarack Quarry would be expanded by approximately 21 acres, for a total area of approximately 50 acres. With the No Action Alternative the quarry would not be expanded beyond the permitted area.

Reviewers provided the FS with their comments during the review period of the DEIS. These comments along with the FS responses are included in this FEIS in Appendix F. A copy of the FEIS is available online at http://www.fs.fed.us/r6/mthood under Projects & Plans.

Summary

The proposed action is to expand the existing Tamarack Quarry (formerly known as the Mud Creek Quarry) to encompass approximately 70 acres of National Forest system land. Rock would be excavated from the existing quarry and expansion area. The Oregon Department of Transportation (ODOT) and the USDA Forest Service (FS) would use the excavated material for road sanding, road maintenance, and construction including improvements to US Highway 26 (US 26) and Oregon Route 35 (OR 35).

The project area is located in the Mt. Hood National Forest approximately four miles south of Government Camp and US 26, in Section 2, Township 4 South, Range 8½ East, Willamette Meridian, Clackamas County, Oregon. The Tamarack Quarry is approximately 1.5 miles south of Trillium Lake. The project area encompasses approximately 49 acres adjacent to (generally north and east of) the existing Tamarack Quarry. The existing quarry occupies approximately 22 acres; under an existing permit, it can encompass a total of 29 acres. The project area also includes a corridor, approximately 3.1 miles long, along the existing haul route to the quarry from US 26. The haul route is along FS roads 2656 and 2656-955. No improvements are proposed to the haul route except for routine maintenance, which may include resurfacing, structural repairs, striping, placement of safety reflectors, and placement of additional traffic signs. No culvert replacement, road widening, pullout or turn-around construction is proposed.

The purpose of the proposed action is to secure a long-term, economical source of rock material for the FS and ODOT to use for highway and road maintenance (including road sanding), construction, and emergency repairs, as well as for road closures and stream and other site restoration projects in the Mt. Hood area. The proposed action is needed because the ODOT and FS demand over the next 20 years (more than two million cubic yards of rock) is projected to exceed the supply from other existing sources. In order for ODOT to provide a safe and cost-efficient highway system near Mt. Hood (US 26 and OR 35), a secure, long-term source of material nearby is essential. The need for sanding material has also become critical because the previous primary source of material (White River) is no longer available.

Through analysis, ODOT and the FS have determined that the site of the Tamarack Quarry is preferred over other quarry sites in the vicinity of Mt. Hood. Tamarack Quarry has the potential to be a relatively large quarry. It has been excavated and managed in a manner that facilitates continued excavation, and it has reserves of quality source rock. The quarry has a relatively short haul route (approximately 3.1 miles) to US 26. However, the size of the existing quarry is inadequate to provide the amount of rock material needed over the next 20 years. Therefore, the quarry needs to be expanded. Commercial sources are generally more expensive.

Alternative 1 would expand the Tamarack Quarry by approximately 41 acres (to the north and east of the existing quarry) more than what is currently permitted, for a total area of approximately 70 acres. It was developed with the objective of maximizing the amount of material that could be obtained from the quarry while still complying with applicable regulations

Summary

The proposed action is to expand the existing Tamarack Quarry (formerly known as the Mud Creek Quarry) to encompass approximately 70 acres of National Forest system land. Rock would be excavated from the existing quarry and expansion area. The Oregon Department of Transportation (ODOT) and the USDA Forest Service (FS) would use the excavated material for road sanding, road maintenance, and construction including improvements to US Highway 26 (US 26) and Oregon Route 35 (OR 35).

The project area is located in the Mt. Hood National Forest approximately four miles south of Government Camp and US 26, in Section 2, Township 4 South, Range 8½ East, Willamette Meridian, Clackamas County, Oregon. The Tamarack Quarry is approximately 1.5 miles south of Trillium Lake. The project area encompasses approximately 49 acres adjacent to (generally north and east of) the existing Tamarack Quarry. The existing quarry occupies approximately 22 acres; under an existing permit, it can encompass a total of 29 acres. The project area also includes a corridor, approximately 3.1 miles long, along the existing haul route to the quarry from US 26. The haul route is along FS roads 2656 and 2656-955. No improvements are proposed to the haul route except for routine maintenance, which may include resurfacing, structural repairs, striping, placement of safety reflectors, and placement of additional traffic signs. No culvert replacement, road widening, pullout or turn-around construction is proposed.

The purpose of the proposed action is to secure a long-term, economical source of rock material for the FS and ODOT to use for highway and road maintenance (including road sanding), construction, and emergency repairs, as well as for road closures and stream and other site restoration projects in the Mt. Hood area. The proposed action is needed because the ODOT and FS demand over the next 20 years (more than two million cubic yards of rock) is projected to exceed the supply from other existing sources. In order for ODOT to provide a safe and cost-efficient highway system near Mt. Hood (US 26 and OR 35), a secure, long-term source of material nearby is essential. The need for sanding material has also become critical because the previous primary source of material (White River) is no longer available.

Through analysis, ODOT and the FS have determined that the site of the Tamarack Quarry is preferred over other quarry sites in the vicinity of Mt. Hood. Tamarack Quarry has the potential to be a relatively large quarry. It has been excavated and managed in a manner that facilitates continued excavation, and it has reserves of quality source rock. The quarry has a relatively short haul route (approximately 3.1 miles) to US 26. However, the size of the existing quarry is inadequate to provide the amount of rock material needed over the next 20 years. Therefore, the quarry needs to be expanded. Commercial sources are generally more expensive.

Alternative 1 would expand the Tamarack Quarry by approximately 41 acres (to the north and east of the existing quarry) more than what is currently permitted, for a total area of approximately 70 acres. It was developed with the objective of maximizing the amount of material that could be obtained from the quarry while still complying with applicable regulations

and Mt. Hood National Forest Land and Resource Management Plan (LRMP) standards and guidelines.

With Alternative 2, the Tamarack Quarry would be expanded by approximately 21 acres over the currently permitted 29 acres, for a total area of approximately 50 acres. Alternative 2 modifies Alternative 1 to address key issues raised through scoping while still providing enough rock to provide a long-term source. The amount of material removed and duration of use would be less under Alternative 2 than under Alternative 1.

Under the No Action alternative the existing permit would remain in place, and the quarry would not be expanded beyond the current permit boundaries. Under the No Action Alternative the FS would be the primary user of the quarry and ODOT would use the quarry in emergency situations. The FS estimates the existing quarry would yield approximately 750,000 cubic yards of material.

ODOT and the FS also considered other quarry sites in the Mt. Hood area to provide an economical long-term rock material source near US 26 and OR 35. Of the five other quarries, four are small and do not contain an adequate quantity of material (Laurel Hill, Skyline, Kiyi, and Jackey). The one quarry that is large enough (Shell Rock) was eliminated because of the poor quality of material and the environmental constraints of visual impacts along Road 17 and the municipal watershed.

With both Action Alternatives, rock would be excavated first from the remaining seven acres in the currently permitted area, then in the expansion area. Expansion would not occur all at once. It would occur in stages, as additional rock resources are needed. All existing vegetation would eventually be removed within the expansion area, and the area would be revegetated per the reclamation plan. A reclamation plan has been developed by the FS and ODOT, and would be implemented and updated as expansion occurs. Overburden soil has been and would continue to be saved for use during later reclamation of the quarry.

The amount of material ODOT would remove each year could range from fewer than 40,000 cubic yards to more than 90,000 cubic yards. The FS would extract 10,000 to 15,000 cubic yards of rock per year for project work other than emergencies. According to preliminary estimates by the FS, the total expanded quarry area with Alternative 1 would contain in excess of two million cubic yards of material. Based on extracting approximately 100,000 cubic yards per year, ODOT and the FS would use the quarry for 20 years or more.

Activities would include clearing vegetation, blasting, rock crushing, screening, batching, loading and hauling, importing excess materials (e.g., soils for reclamation and rock from off-site), and some short-term stockpiling of excavated rock and soils. Activities would be subject to timing restrictions to minimize conflicts with recreation and wildlife. No noise-generating or hauling activities would occur on weekends, federal holidays, or any time between the first measurable snowfall and mid-April, except for emergencies. ODOT would be responsible for plowing two

lanes with turnouts on the haul route, as needed, as early as the second full week of April. Typically the FS opens the road a week or two prior to Memorial Day weekend.

No improvements would be made to the haul route except for routine maintenance, which may include resurfacing, structural repairs, striping, placement of safety reflectors, and placement of additional traffic signs. ODOT would pay for a commensurate portion of haul route maintenance.

The project area is within the Mt. Hood National Forest and is subject to the forest-wide standards and guidelines of the LRMP and the Northwest Forest Plan. This final Environmental Impact Statement (DEIS) is tiered to the EIS's that were prepared for the LRMP and the Northwest Forest Plan. The project area is located on the land management designation "Matrix," which allows for activities such as timber harvest and mineral exploration and is subject to the standards and guidelines of the Northwest Forest Plan.

Notices of the proposed action and DEIS were published in the Federal Register (January 15 and May 2, 2002). The project was also listed in the Mt. Hood National Forest's quarterly publication that announces proposed actions in Fall 2002 thru Summer 2005. This quarterly announcement is mailed to approximately 300 groups and individuals and is also available online. Notice of the proposed action was also posted on the Mt. Hood National Forest website: (www.fs.fed.us/r6/mthood). No comments were received following the notices. The project was presented at a public open house on December 5, 2002, at the Mt. Hood National Forest Headquarters in Sandy, Oregon. Several people provided verbal comments at the open house, and the FS received one written comment. An open house with this and other projects was also held on May 13, 2004, at the Lions Club in Welches, Oregon. No comments on this project were received from the public. The DEIS was distributed for public review in July 2004. Four letters were received and are included along with responses in this FEIS.

The following were identified as key issues:

- Scenic Resources: What are the potential project effects on views from key viewpoints on the Mt. Hood National Forest?
- Transportation/Access: What is the potential for increased traffic conflicts between commercial vehicles (i.e., trucks hauling rock) and recreation use (e.g., vehicles entering/leaving Trillium Lake Campground)?
- Recreation: What effects would the project have on cross-country ski trails in the vicinity of the quarry?
- Threatened and Endangered Species: Would the project result in adverse effects to any species listed or proposed for listing under the Endangered Species Act?

Analysis of the key issues and resources determined that the project would meet visual quality objectives as seen from key viewpoints such as Timberline Lodge. ODOT and the FS would limit activities on weekends and holidays and use flaggers and signs to avoid conflicts between heavy truck traffic and recreational users and vehicles. The expansion area would impact a cross-

country trail on the eastern edge of the existing quarry; the trail would be relocated as part of the project. The Action Alternatives would have a “may affect but not likely to adversely affect” determination for the northern spotted owl due to removal of dispersal habitat and disturbance from blasting. Nesting, roosting and foraging habitat for the northern spotted owl would not be removed. No other listed plant, wildlife, or fish species would be affected by the project. Existing soils and hydrology would be altered by the expansion. The project area is not within any riparian reserves, and an erosion control plan is expected to control sediments generated by quarry activities. Vegetation would be altered, as up to 48 acres of early and mid-seral stage forest would be removed over a 20-or-more-year period. The entire quarry would be revegetated in stages. There are no historic or pre-historic resources within the project area.

Long-term, cumulative effects are those that result from the incremental impact of the federal action when added to other past, present, and reasonably foreseeable future federal, state, or private activities that would occur within the action area. Cumulatively, the expansion of the quarry would result in a long-term commitment of resources since it would remove large quantities of rock and create long-term soil and vegetation impacts on up to 70 acres. Although reclamation of the site is planned, the site productivity of the area would be significantly reduced for the long term. Future and foreseeable actions that are scheduled to occur in the Salmon River Watershed other than the proposed action include the Salmonberry #5 commercial thinning timber sale, the Timberline Express Ski Lift at the Timberline Ski Area, the Government Camp fuels reduction project, and trail development in accordance with the Government Camp Trails Master Plan for the Mt Hood area. None of these projects are in the immediate vicinity of the quarry. No other new quarry operations are proposed in the Mt. Hood National Forest. Past activities include previous timber clear-cuts, fire, road construction, and recreation development. Minor cumulative detrimental impacts to soils, wildlife habitat, transportation systems, recreation, and scenic resources, and negligible impacts to the watershed are expected.

Table of Contents

APPENDICES

List of Tables

List of Figures

Tamarack Quarry Expansion Project

Final Environmental Impact Statement

Chapter 1

Purpose of and Need for Action

Changes between Draft and Final EIS:

(Minor corrections, clarifications, and edits are not included in this list.)

- Added information regarding project need.
- Updated public involvement section.
- Updated direction concerning survey and manage species

1 PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION

This final environmental impact statement (FEIS) was prepared in accordance with the National Environmental Policy Act (NEPA), as amended; NEPA regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508); the US Department of Agriculture (USDA) Forest Service (FS) guidelines for implementing NEPA that are included in the Forest Service Manual Chapter 1950 and Forest Service Handbook 1909.15; the Notice, Comment and Appeal Procedures for National Forest System Projects and Activities (36 CFR Part 215); and other related statutes and orders. The goal of the document is to compare the alternatives developed for the Tamarack Quarry in Chapter 2, to disclose the potential environmental effects associated with each alternative, and to allow the Forest Supervisor to make an informed decision regarding future management of the Tamarack Quarry.

The FS is the lead agency and has primary responsibility for preparing this FEIS. The Oregon Department of Transportation (ODOT) and other responsible agencies have also participated in the identification of issues and alternatives for the DEIS.

The proposed action is to expand the Tamarack Quarry as described in Section 1.4. Alternatives for the proposed action are described in Chapter 2.

1.2 PROJECT AREA LOCATION AND DESCRIPTION

The project area is approximately four miles south of Government Camp and US Highway 26 (US 26), in Section 2, Township 4 South, Range 8½ East, Willamette Meridian, Clackamas County, Oregon, on the Mt. Hood National Forest. The Tamarack Quarry is approximately 1.5 miles south of Trillium Lake. Figure 1 shows the project area and location. The haul route for the quarry is along FS roads 2656 and 2656-955.

The project area encompasses approximately 48 acres adjacent to (generally north and east of) the existing Tamarack Quarry. The existing quarry occupies approximately 22 acres, although it is currently permitted to expand to 29 acres (Oregon Department of Geology and Mineral Industries [DOGAMI] Permit Number 03-0092).

Two perennial streams are near the project area. The first is Mud Creek, the only named stream near the project site, which issues from Trillium Lake. The other is an unnamed stream originating from Summit Meadows. Both are headwater tributaries to the Salmon River. The entire length of the Salmon River, from its headwaters to its confluence with the Sandy River, is designated a Wild and Scenic River. The Sandy River is designated Wild and Scenic from its headwaters to the Mt. Hood National Forest boundary.[1]

[1] In 1968, Congress enacted the Wild and Scenic Rivers Act to preserve the free-flowing conditions of and protect the immediate environment of selected rivers that possess outstandingly remarkable scenic, recreational, fish and wildlife, or other values.

Activities would be subject to timing restrictions, as described in Section 2.2. Blasting would be allowed after July 15 only. No noise-generating or hauling activities would occur at night, on weekends, during holidays, or any time between the first measurable snowfall and mid-April, except for emergencies. ODOT would be responsible for plowing two lanes with turnouts on the haul route, as needed, as early as the second full week of April. Typically the FS opens the road a week or two prior to Memorial Day weekend.

The haul route from its junction with US 26 to the quarry is approximately 3.1 miles long, entirely on National Forest System lands, and includes FS roads 2656 and 2656-955. FS road 2656 is surfaced with asphalt. FS spur road 955 is gravel surfaced. No improvements would be made to the haul route except for routine maintenance, which may include resurfacing, structural repairs, striping, placement of safety reflectors, and placement of additional traffic signs. ODOT would pay for a commensurate portion of haul route maintenance. Traffic control, which may include flaggers and signs, would be implemented during hauling. Typical hauling trucks have a 20-cubic-yard capacity. No culvert replacements, road widening, pull-out or turn-around construction would occur as part of the proposed action.

A FS geologist estimated the remaining volume of good quality rock to be at least two million cubic yards. The geologist estimated the volume of the remaining in-place rock based on the topographic information from a 1”=100’ site map, the location of surface outcrops, limited drill hole information, an assumption that good quality rock extends north beyond the drill hole locations for about 250 feet, and allowing for 20 percent of the volume to be soil and poor quality rock. The basic assumption is that the spur ridge landform is mostly underlain by the same andesite rock unit. Due to the extensive rock outcrops on the south side of the spur ridge there was little need for subsurface exploration until plans developed to excavate an upper bench. The FS drilled three exploratory holes in 1978. These drill holes are located approximately 150 feet northeast of the present quarry development limit. The drill holes were approximately 120 to 200 feet deep and indicated there is 180 feet or more of good quality rock below about 6 to 20 feet of soil. Additional drilling would be completed to verify the presence of good quality rock before expansion.

A reclamation plan has been developed by the FS and ODOT, and would be implemented and updated as expansion occurs (Appendix G). A reclamation plan is a required condition of any approved plan of operations. The reclamation plan provides details about how ODOT expects to accomplish reclamation objectives. A diagram showing how waste rock will be arranged in the mine and the final grade of the reclaimed area is a mandatory part of the reclamation plan. Reclamation includes filling and stabilizing the quarry, spreading waste rock across the quarried area, adding any topsoil and vegetation removed during excavation, and planting native vegetation. Overburden soil has been and would continue to be saved for use during later reclamation of the quarry. The soil would be pushed back into the quarry benches and floors and planted with erosion-preventing, native grasses and other vegetation when the excavation is completed. The slope of the reclaimed quarry area would be between zero and ten percent. Portions of the quarry could be reclaimed in stages, depending on the final quarry excavation

plan. ODOT has the option of hiring specialists to help with the revegetation portion of the reclamation or providing funding for FS assistance. The reclamation plan would follow the water and erosion control, soil salvage and replacement, and land shaping and revegetation best management practices described in the DOGAMI Mineral Land Regulation and Reclamation Program's manual aggregate mines (Open-File Report O-96-2). DOGAMI requires a reclamation plan to be submitted as part of the Division 30 Operating Permit application.

1.5 PURPOSE AND NEED

The purpose of the proposed action is to secure a long-term, economical source of rock material for the FS and ODOT to use on highways and forest roads near Mt. Hood. Current and near-term demand by ODOT and the FS is projected to exceed supply from ODOT and FS sources. Commercial sources are generally more expensive.

ODOT and the FS estimate that more than two million cubic yards of rock would be needed over the next 20 years for highway and road maintenance, construction, and emergency repairs, as well as for road closures and stream and other site restoration projects in the Mt. Hood area. ODOT (Regions 1 and 4) has historically utilized and predicts to continue to need approximately 40,000 cubic yards of material each year for sanding Mt. Hood area roadways (Hay, pers. comm., 2005). Planned road improvement projects and emergency repairs would require an additional approximate average of 50,000 cubic yards of material each year (Hay, pers. comm., 2005). Table 1-1 shows estimated material needs for the FS and ODOT Regions 1 and 4.

Table 1-1. 20-Year Estimated Material Needs for FS and ODOT

	Maintenance/Sanding	Construction	Emergency
FS	250,000	0	0
ODOT Region 1	500,000	322,000	400,000
ODOT Region 4	240,000	310,000	200,000
Total	990,000	632,000	600,000

The FS has had a long successful partnership with ODOT in providing public access to the Mt. Hood area. This partnership is important because a significant portion of the traffic in this area is from the public utilizing the many year round recreational opportunities in this portion of the Forest. Providing a dependable source of rock material for highway construction and maintenance helps meet the goals of both agencies in providing access to recreational opportunities. This is especially true for sanding material where a significant portion of the wintertime traffic is for snow related recreation.

ODOT has been faced with a nearly constant need for highway construction and maintenance materials on US 26 and OR 35 near Mt. Hood. This need became especially apparent after the October 2000 flood, which washed out portions of OR 35. During the emergency repair work it was estimated the cost of the material needed for riprap would total almost $240,000 if secured

from the closest commercial source. The FS agreed to supply the rock material but recognized that expansion of existing sources would be necessary to meet future demand. ODOT has expressed that, in order to provide a safe and cost-efficient highway system near Mt. Hood, a secure, long-term source of material near Mt. Hood is essential. The need for sanding material has also become critical since the previous primary source of material (White River) is no longer available.

Through analysis, ODOT and the FS have determined that the site of the Tamarack Quarry is preferred over other quarry sites in the vicinity of Mt. Hood. Tamarack Quarry has the potential to be a relatively large quarry. It has been excavated and managed in a manner that facilitates continued excavation and appears to have reserves of quality source rock. The quarry has a relatively short haul route (approximately 3.1 miles) to US 26. However, the size of the existing quarry is inadequate to provide the amount of rock material needed over the next 20 years. Therefore, the quarry needs to be expanded.

1.6 DECISIONS TO BE MADE

The FS will decide whether or not to expand the quarry and, if the decision is to expand, to determine the extent of the quarry expansion.

1.7 MANAGEMENT DIRECTION

1.7.1 Mt. Hood National Forest Plan

The project area is within the Mt. Hood National Forest and is subject to the forest-wide standards and guidelines of the Land and Resource Management Plan (LRMP) for the Mt. Hood National Forest (FS, 1990). This FEIS is tiered to the FEIS that was prepared for the LRMP.

The project area land management allocation designations for the quarry and proposed expansion area are “B2, Scenic Viewshed” and “C1, Timber Emphasis.” Forest-wide standards and guidelines that apply to the project area include those related to soil productivity; air quality; water quality; riparian areas; fisheries; forest diversity; threatened, endangered, and sensitive plants and animals; wildlife; forest protection and public safety; transportation systems and facilities; travel and access; dispersed recreation; visual resource management; cultural resource management; human rights; special uses; and special forest products.

1.7.2 Northwest Forest Plan

In 1993, President Clinton directed an interagency task force (the Forest Ecosystem Management Assessment Team, or FEMAT) to identify management alternatives to resolve ongoing disputes about the management of federal forest lands in the range of the northern spotted owl. The management alternatives needed to comply with existing laws, take an ecosystem approach to managing for biological diversity, and produce the highest contribution to economic and social well-being. The plan applies to over 24 million acres of public land managed by the FS and Bureau of Land Management (BLM), including Mt. Hood National Forest land. The *Record of*

Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and the *Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl* (Northwest Forest Plan) (FS and BLM, 1994) apply to the project area. This analysis is tiered to the EIS that was prepared for the Northwest Forest Plan.

The project area is located on the land management designation "Matrix," which allows for activities such as timber harvest and mineral exploration and is subject to the standards and guidelines of the Northwest Forest Plan.

A portion of the Northwest Forest Plan was modified by the *Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures standards and Guidelines* (2001 Survey and Manage ROD) (FS and BLM, 2001). This ROD amended a portion of the Northwest Forest Plan by adopting new standards and guidelines for Survey and Manage, Protection Buffers and other mitigation measures.

A portion of the Northwest Forest Plan was again modified by the *Record of Decision to Remove or Modify the Survey and Manage Mitigation Standards and Guidelines* (Survey and Manage ROD) (FS and BLM, 2004a). The 2004 Survey and Manage ROD removed the Survey and Manage Mitigation Standards and Guidelines, replacing them with Special Status Species Policies. However in January of 2006 a court decision in the Western District of Washington (CV No. 04-844P) set aside this Record of Decision and reinstated the 2001 Survey and Manage ROD including any amendments or modifications that were in effect as of March 21, 2004.

A portion of the Northwest Forest Plan was modified by the march 2004 *Record of Decision Amending Resource Management Plans for Seven Bureau of Land Management Districts and Land and Resource Management Plans for Nineteen national Forests Within the Range of the Northern Spotted Owl, Decision to Clarify Provisions Relating to the Aquatic Conservation Strategy* (FS and BLM 2004b). This ROD clarified the proper spatial and temporal scale for evaluating progress toward attainment of ACS objectives and clarified that no project level finding of consistency with the ACS objectives is required.

1.8 PUBLIC INVOLVEMENT

Notices of the proposed action and DEIS were published in the Federal Register (January 15 and May 2, 2002). The project was also listed in the Mt. Hood National Forest's quarterly publication that announces proposed actions in Fall 2002 thru Summer 2005. This quarterly announcement is mailed to approximately 300 groups and individuals and is also available online. The first Federal Register publication was a notice of intent to prepare the EIS. The second publication was a notice of title change (from Palmer Quarry to Tamarack Quarry). Notice of the proposed action was also posted on the Mt. Hood National Forest website: (www.fs.fed.us/r6/mthood, under "publications"). No comments were received following the notices.

The project was presented at a public open house on December 5, 2002, at the Mt. Hood National Forest Headquarters in Sandy, Oregon. Several people provided verbal comments at the open house, and the FS received one written comment. Key issues raised are summarized in Section 1.9.

An open house with the proposed project and other projects was held on May 13, 2004, at the Lions Club in Welches, Oregon. No public comments on the proposed project were received.

The DEIS was released for public comment on July 2004. Four letters were received and are included along with responses in Appendix G.

1.9 KEY ISSUES

NEPA directs federal agencies to focus analysis and documentation on the significant issues related to a proposed action. The scoping process resulted in the identification of some potential issues to be addressed in the DEIS. They are listed below.

Scenic Resources: What are the potential project effects on views from key viewpoints on the Mt. Hood National Forest?

Timberline Lodge, a National Historic Landmark, is located at the tree line of the south flank of Mt. Hood. Removing additional vegetation and rock material from the Tamarack Quarry may make the quarry visible from Timberline Lodge. The lodge is one of the most visited sites in Oregon and offers visitors panoramic views of the Cascade Mountains. If the rock quarry were visible it would have the potential to degrade this view. Effects will be measured by using computer simulation models to compare the existing view with the view that would result from the alternatives considered.

Transportation/Access: What is the potential for increased traffic conflicts between commercial vehicles (i.e., trucks hauling rock) and recreation use (e.g., vehicles entering/leaving Trillium Lake Campground)?

This area of the Forest is a popular recreation area in both the summer and winter. Expanding the quarry would have the potential to increase vehicle traffic in this area and thereby increase vehicle conflicts between commercial users and recreation users. Effects will be measured by evaluating any changes in traffic volumes and patterns and any changes to the road system accessing this area.

Recreation: What effects would the project have on cross-country ski trails in the vicinity of the quarry?

This area is a popular cross-country skiing in the winter. Expanding the quarry could impact some cross-country trails and alter that recreation use. Effects will be measured by identifying the existing ski trails and evaluating the impacts, if any, that would occur with the alternatives under consideration.

Threatened and Endangered Species: Would the project result in adverse effects to any species listed or proposed for listing under the Endangered Species Act?

Several federally listed species occur on the Mt. Hood National Forest, including the northern spotted owl, bald eagle, chinook salmon, and steelhead. The quarry expansion would clear several acres of forest, and quarry activities would generate noise. Potential impacts will be measured by identifying listed species that could occur in the project area, determining how they may use the area, and assessing the biological effects of the alternatives through consultation with the responsible agencies.

1.10 OTHER ACTIONS AND PERMITS

If an alternative other than the No Action Alternative is selected, a number of other discretionary actions may be required prior to project implementation. Those actions include:

- Issuance of Special Use Permits from the FS to ODOT
- US Fish and Wildlife Service (USFWS)—Endangered Species Act (ESA) Section 7 consultation for effects to the northern spotted owl (Appendix D)
- Obtaining a Simple Air Contaminant Discharge Permit (ACDP) from the Oregon Department of Environmental Quality (DEQ) for rock crushing operations
- Obtaining a DOGAMI Division 30 Operating Permit for the expansion area

Tamarack Quarry Expansion Project

Final Environmental Impact Statement

Chapter 2
Alternatives

Changes between Draft and Final EIS:

(Minor corrections, clarifications, and edits are not included in this list.)

- Added reference to reclamation plan.

2 ALTERNATIVES

2.1 INTRODUCTION

This chapter describes the alternatives being considered and those eliminated from further study and why. It also describes how the alternatives differ in responding to the key issues listed in Section 1.9.

The alternatives were developed cooperatively by the FS and ODOT. Three alternatives are analyzed. Alternative 1 was developed with the objective of maximizing the amount of material that could be obtained from the quarry while still complying with applicable regulations. Alternative 2 modifies Alternative 1 to address the key issues raised through scoping while still providing enough rock to meet the identified needs. The third alternative is the No Action Alternative.

The three alternatives selected for further evaluation are practical or feasible in terms of technical factors, economic factors, and resource capability.

2.2 ALTERNATIVES CONSIDERED IN DETAIL

2.2.1 Alternative 1

Alternative 1 would expand the Tamarack Quarry by approximately 41 acres more than what is currently permitted, for a total area of approximately 70 acres (see Figure 2). Expansion would occur to the north and east of the existing quarry as shown on Figure 2. All existing vegetation would be removed within the 41-acre expansion area. Rock would be excavated first from the remaining seven acres in the currently permitted area, then in the expansion area. The excavated material would be used by ODOT and the FS for road maintenance and construction, including improvements to US 26 and OR 35. The amount of material ODOT would remove each year could range from fewer than 40,000 cubic yards to more than 100,000 cubic yards. According to preliminary estimates by the FS, the total expanded quarry area with Alternative 1 would contain in excess of two million cubic yards of material. Based on extracting 100,000 cubic yards per year, ODOT and the FS would use the quarry for 20 years or more.

Activities would include clearing vegetation, blasting, rock crushing, screening, batching, loading and hauling, importing excess materials (e.g., soils for reclamation and rock from off-site), and some short-term stockpiling of excavated rock and soils. Table 2-1 shows when various activities would be permitted. No noise-generating or hauling activities would occur at night, on weekends, during holidays, or any time between the first measurable snowfall and mid-April, except for emergencies. ODOT would be responsible for plowing two lanes with turnouts on the haul route, as needed, as early as the second full week of April. Typically the FS opens the road one or two weeks prior to Memorial Day weekend.

Under Alternative 1 (as with Alternative 2), a reclamation plan has been developed by the FS and ODOT, and would be implemented and updated as expansion occurs. A copy of this plan is in Appendix G. Overburden soil has been and would continue to be saved for use during later reclamation of the quarry. The soil would be pushed back into the quarry benches and floors and planted with erosion-preventing, native grasses and other vegetation when the excavation is completed. Portions of the quarry could be reclaimed in stages, depending on the individual updates of the quarry development plan.

2.2.2 Alternative 2

With Alternative 2, the Tamarack Quarry would be expanded by approximately 21 acres over the currently permitted 29 acres, for a total area of approximately 50 acres. The expansion would occur primarily toward the north and east, as shown on Figure 2, but the smaller expansion area would reduce visual impacts of the quarry when viewed from the Timberline Lodge area. All existing vegetation would be removed within the 21-acre expansion area. Rock would be excavated first from the remaining seven acres in the currently permitted area, then from the expansion area. The excavated material would be used by ODOT and the FS for road maintenance and construction, including improvements to US 26 and OR 35. The amount of material ODOT would remove each year could range from fewer than 40,000 cubic yards to more than 100,000 cubic yards. According to preliminary estimates by the FS, the total quarry area with Alternative 2 would contain up to two million cubic yards of material. Based on extracting 100,000 cubic yards per year, ODOT and the FS would use the quarry for approximately 20 years.

Activities would be similar to those described for Alternative 1, with timing restrictions as shown in Table 2-1. Blasting would be allowed after July 15 only. No noise-generating or hauling activities would occur at night, on weekends, during holidays, or any time between the first measurable snowfall and mid-April, except for emergencies. ODOT would be responsible for plowing two lanes with turnouts on the haul route, as needed, as early as the second full week of April. Typically the FS opens the road a week or two prior to Memorial Day weekend.

To minimize potential conflicts with recreation traffic, hauling would not occur on weekends beginning on Fridays at noon, or on federal holidays, unless the quarry is being used for emergency road repairs. When hauling would occur, ODOT would implement traffic control measures (e.g., flagging, temporary signage).

The Quarry Connector trail would be relocated, as described under Alternative 1.

Similar to Alternative 1, no improvements would be made to the haul route except for routine maintenance, which may include resurfacing, structural repairs, striping, placement of safety reflectors, and placement of additional traffic signs. ODOT would pay for a commensurate portion of haul route maintenance. Traffic control, which may include flaggers and signs, would be implemented during hauling. Typical hauling trucks have a 20-cubic-yard capacity. No culvert

replacements, road widening, pull-out or turn-around construction would occur as part of Alternative 2.

A reclamation plan has been developed by the FS and ODOT, and would be implemented as expansion occurs. Generally, reclamation would occur as described for Alternative 1.

2.2.3 No Action Alternative

The quarry would not be expanded under the No Action Alternative. The FS would be the primary user of the quarry and would continue to extract rock from the site within the existing permitted boundaries (approximately 29 acres). The FS estimates that the existing quarry would yield approximately 750,000 additional cubic yards of material.

To meet projected needs maintenance and construction projects, the FS may need to supplement the material removed from the Tamarack Quarry with material from other sources, and ODOT would need to obtain material from other sources. Those sources may include other quarries in the Forest as well as private, commercial suppliers.

Currently, ODOT has only one private supplier as a potential source (Barnhart, pers. comm., 2003). It is the nearest commercial quarry to the Mt. Hood area and is approximately 20 miles from Tamarack Quarry. Other commercial suppliers are considerably farther from the area, and transporting rock from those suppliers would be cost-prohibitive (Barnhart, pers. comm., 2004). Current price is approximately $16 per cubic yard of material (Barnhart, pers. comm., 2003). Assuming ODOT uses an average of 100,000 cubic yards of material each year, the annual cost of using a private supplier would be in excess of $1.6 million.

Activities within the existing permit area would be similar to those described for Alternative 1, although less activity would occur each year with the FS as the primary user. Activities, including hauling, would occur on weekdays (Mondays through Thursdays from 7:00 a.m. to 5:00 p.m., and Fridays from 7:00 a.m. to noon) during the spring, summer, and fall when the haul road is clear of snow. Blasting would be allowed only after July 15 of each year. The haul route would receive normal maintenance. Expansion to the currently permitted boundaries would affect the Quarry Connector trail, which would be relocated under the No Action Alternative.

The quarry is operated under a DOGAMI permit (permit number 03-0092). DOGAMI has a reclamation plan on file for the quarry. According to the reclamation plan for the No Action Alternative, reclamation would begin 30 days after mining is completed at the quarry. Topsoil and overburden piles would be seeded for stabilization, and all areas where overburden is replaced would be stabilized. Because natural landform and existing vegetation provide screening for the quarry, additional screening would not be needed. A vegetated buffer of at least 1,000 feet would provide screening around the entire quarry once mining is completed. All structures, equipment, and refuse would be removed from the site prior to completing reclamation. Benches would be cut into vertical slopes. Topsoil would be stored on-site, then replaced and seeded with

species recommended by the FS. Planting methods and times would also be in accordance with FS recommendations.

2.2.4 Summary of Alternatives

Table 2-2 compares the project alternatives.

Table 2-2. Summary of Alternatives under Consideration

	Acres of Expansion	Total Quarry Acreage	Cubic Yards of Rock Excavated	Years to Complete Mining[2]	Primary User
No Action Alternative	0 (7) [1]	29	750,000	75	FS
Alternative 1	41	70	more than 2 million	20 or more	ODOT
Alternative 2	21	50	up to 2 million	20 or more	ODOT

[1]There would be no expansion of currently permitted quarry boundaries. However, 29 acres are currently permitted, although only 22 acres currently are being actively quarried.

[2]Years are based on FS estimates of available rock quantities, ODOT's estimates of extracting 40,000 to 100,000 cubic yards per year, and FS estimate of extracting up to 10,000 cubic yards per year.

2.3 ALTERNATIVES ELIMINATED FROM DETAILED STUDY

In developing this proposal to provide for an economical long-term rock material source near US 26 for ODOT and the FS, several other sites were considered. In 2002 engineers from both ODOT and the FS evaluated the other quarries that are within an economical hauling distance of US 26 and OR 35. Although most of those quarries are being used and will continue to be used to some extent, they would not meet the identified need for the proposed action for a variety of reasons. The other quarries and the reasons for eliminating them from further consideration are summarized in Table 2-3.

Table 2-3. Alternative Sites Eliminated from Further Study

Quarry Site	Location	Adequate Quantity?	Material Quality	Constraints	Reasons for Eliminating
Laurel Hill	T3S, R8E Section 16	No, very small quarry	Good	Visual impacts and safety along US 26	This site was eliminated because it does not contain an adequate quantity of material and would be difficult to develop because of location next to US 26. It is currently being used as a disposal site.
Skyline	T1S, R11E Section 31	No, this is a small site	Good	Located next to creek and The Dalles Municipal Watershed	This site was eliminated because it does not contain an adequate quantity of material and environmental constraints of the riparian area and the municipal watershed.
Shell Rock	T1S, R10E Section 27	Yes, relatively large site	Poor	Visual impacts along Road 17 and adjacent to The Dalles Watershed	This site was eliminated because of the poor quality of material and the environmental constraints of visual impacts along Road 17 and the municipal watershed.
Kiyi	T1S, R10E Section 2	No, very small site	Good	Undeveloped site, located near several creeks	This site was eliminated because it does not contain an adequate quantity of material, and developing the site would be very expensive and would not be consistent with the LRMP standard of utilizing existing sites before developing new ones.
Jackey	T4S, R9E Section 28	No, this is a small site	Good	Limited space for processing, located near Frog Creek	This site was eliminated because it is too small to provide a long-term rock source.

Tamarack Quarry Expansion Project

Final Environmental Impact Statement

Chapter 3

Affected Environment and Environmental Consequences

Changes between Draft and Final EIS:

(Minor corrections, clarifications, and edits are not included in this list.)

- Added references to reclamation plan.
- Revised northern spotted owl section per public comment.
- Revised mitigation measures for northern spotted owl in accordance with USFWS concurrence letter.
- Revised MIS section per public comment.
- Clarified winter emergency use per public comment.
- Incorporated reference to Senator Wyden's 2004 proposed wilderness area.
- Updated discussion of federally listed anadromous fish species.
- Updated discussions of survey and manage species.
- Updated discussion on management direction for controlling noxious weeds.

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

This chapter describes the existing conditions of the environment that could be affected by each of the alternatives under consideration, as well as the potential effects of those alternatives. The existing conditions information provides a basis for evaluating the environmental consequences of implementing each alternative. This chapter also describes mitigation measures, which would be implemented to lessen project impacts.

The quarry elevation ranges from 3,600 feet to 3,840 feet. Vegetation within the project area is within the Pacific Silver Fir Zone (FS, 1982). Remnant late seral Douglas-fir trees are scattered throughout the proposed expansion area and constitute what remains of the overstory canopy. Pacific silver fir, western hemlock, mountain hemlock, and western red cedar occur in the midstory and understory. Pacific rhododendron dominates most of the expansion area with scattered areas dominated by huckleberry. The herb layer is sparse with bear-grass as the dominant herb. There is a high level of large down logs in the project area, with all size and decay classes represented.

3.2 SUMMARY OF EFFECTS ON KEY ISSUES

Table 3-1 shows a summary of the expected effects of each alternative on the key issues identified during scoping.

Issue	Alternative 1	Alternative 2	No Action Alternative	Criteria
Recreation: What effects would the project have on cross-country ski trails in the vicinity of the quarry?	Winter plowing of the haul route during emergency situations before April 15 would displace activity on the main portions of the Trillium Lake Loop cross-country ski trail. Relocation of the Quarry Connector trail around the quarry for winter cross-country skiing (suitable for beginner to intermediate skiers) and summer mountain biking use (suitable for intermediate bikers).	Winter plowing of the haul route during emergency situations before April 15 would displace activity on the main portions of the Trillium Lake Loop cross-country ski trail. Relocation of the Quarry Connector trail as in Alternative 1.	Potential for winter plowing that would interfere with Trillium Lake Loop cross-country skiing only during emergencies. Relocation of the Quarry Connector trail as in Alternative 1.	N/A
Threatened and Endangered Species: Would the project result in adverse effects to any species protected by the Endangered Species Act?	Northern spotted owl: may affect, not likely to adversely effect. Bald eagle: no effect. Canada lynx: no effect.	Same as Alternative 1.	Same as Alternative 1.	Northern spotted owl: dispersal habitat may be removed and operations may disturb nesting owls after the critical nesting period. Bald eagle: no removal of bald eagle nesting, winter roosting or foraging habitat; assumed that project noise would not impact non-breeding eagles. Canada lynx: no habitat present.

3.3 SCENIC RESOURCES

This section summarizes information on existing scenic resources, management direction, and potential effects of the alternatives under consideration. Additional information is available in the Visual Resources Technical Report in Appendix A.

3.3.1 Existing Conditions

3.3.1.1 Scenic Resource Management

The LRMP and the Final Environmental Impact Statement (FEIS) for the LRMP provide the primary direction for management of scenic resources on the project site. The plan designates the existing quarry as C1 Timber Emphasis and the surrounding landscape as B2 Scenic Viewshed, specifically the Timberline Lodge Viewshed with the viewer position being the lodge and the background extending to approximately twelve miles (FS, 1990). The C1 designation applies to areas currently screened from Timberline Lodge by the existing landform. Both of the Action Alternatives would remove portions of the landform and expose C1 areas to view from the lodge. Therefore, for the purposes of this study, the areas that would become visible through the proposed Action Alternatives are considered part of the B2 Scenic Viewshed.

Visual Quality Objectives (VQOs) are established in the LRMP and describe the degree of acceptable alteration to the landscape in terms of visual contrast with the surrounding landscape within Distance Zones from selected viewer positions (FS, 1990).

Management activities must be consistent with the prescribed VQO for the viewshed shown in Table 3-2.

Table 3-2. Timberline Lodge Viewshed Visual Quality Objectives

Distance Zone	Distance from Key Viewing Area	Visual Quality Objective
Foreground	up to 0.5 mile	Retention
Middleground	0.5 to 5 miles	Partial Retention
Background	beyond 5 miles	Partial Retention

Desired future conditions have been established in the LRMP. Given the key viewing area of Timberline Lodge (see Section 3.3.1.3), which is located approximately 5.7 miles north of the quarry, the Middleground and Background objectives of Partial Retention apply to the management intensity for the project. The LRMP provides specific direction for these objectives:

- Natural appearing forest landscape, with little evidence of human alteration
- Dominant visual impression is mostly continuous tree canopies, with diversity in occasional natural appearing openings

- Mosaic of species and age classes add texture and color contrast in natural patterns
- Management activities repeat form, line, color and texture common to the characteristic landscape

3.3.1.2 Landscape Setting

Recreational activities abound in the Mt. Hood National Forest with nearby trails, roads, rivers, lakes, campgrounds, and ski areas. US 26 and OR 35 serve as the major access corridors to the area; numerous FS roads provide a well-used network throughout the project vicinity. The site is approximately 1.5 miles south of Trillium Lake, which receives significant, year-round recreation. Historically, the Salmon River Watershed has been used by American Indians as a major huckleberry picking area, particularly in the Sherar Burn, Mud Creek, and High Rock areas (FS, 1995). The Sherar Burn area (an area burned by wildfire approximately 70 years ago) is still used by American Indians for huckleberry picking and bear grass harvesting, and by recreation users for berry picking. There are no mature trees to screen the view of the quarry from the Sherar Burn.

The project is in an area of high visual quality importance, dominated with mature Douglas-fir forest. Snow-capped peaks of Mt. Hood, Mt. Jefferson, and ridgelines in the Cascade Range augment the area's scenic quality. Timber harvest activities have resulted in an unnatural patchwork pattern in several areas and create strong visual contrast when viewed from Timberline Lodge. Trillium Lake, also viewed from Timberline Lodge, creates a distinct, natural appearing contrast amid the surrounding forested landscape.

Climatic conditions vary dramatically and affect the visual environment. The vicinity receives a significant amount of rain and snow annually. Fog and low clouds are common and block views beyond the foreground. Haze and smoke may also affect the seen environment depending on local conditions. During exceptionally clear winter weather, snow glare may affect the views in the foreground and exacerbate contrast in the middle and background.

3.3.1.3 Key Viewing Areas

Conversations with FS staff, a review of relevant and available mapping, visitor use information, limited geographic information system (GIS) spatial analyses, and public comment led to the conclusion that Timberline Lodge is the only key viewing area for this project. Therefore, the following discussions on landform and waterform, effects, and impacts are presented in the context of being viewed from Timberline Lodge.

The key viewing area for the analysis is from the "picture window" on the second floor of the main entrance to Timberline Lodge.

The campground and dam at Trillium Lake are also considered important viewing areas, as are Sherar Burn Road and the Salmon River corridor. Therefore, limited analysis was conducted to determine potential visual impacts of the project from those areas.

3.3.1.4 Landform

The surrounding landform is mountainous and bold, typical of the Cascade Range. The jagged peak of Mt. Jefferson and distant ridges to the south are silhouetted against the skyline as shown on Figures 3 and 4.

As viewed from Timberline Lodge, the foreground features strong, interesting contrast in form, line, color, and texture created by the juxtaposition of mature forest canopy, snags, ski runs, the slopes of Mt. Hood, talus, the horizon line, and middleground/background imagery. Structures associated with the lodge, such as buildings, ski lifts, utilities, and other hardscape elements, are part of the existing landscape character.

The existing quarry, viewed from the lodge, is tucked behind a ridgeline and is not visible. A small, forested knoll north of the quarry has the potential to screen or partially screen the proposed expansion from view. Undulating horizontal bands of color, shadow, and texture create visual interest in the middleground and background as forested slopes fade into the distance. Colors fade from dark green to blue and gray depending on light conditions. Several prominent buttes and ridgelines dominate the middleground. Previous timber harvest practices have resulted in an unnatural-appearing patchwork plainly visible from the lodge. A short section of FS road 266-130 is visible east of Trillium Lake during winter conditions and appears as a natural scar on the landscape. Mt. Jefferson's silhouette on the horizon creates a focal point in the distant background.

3.3.1.5 Waterform

Trillium Lake is the only water body visible from the key viewing area. It creates strong, natural appearing contrast in color and texture against the dark green forest canopy. The lake also provides a middleground focal point throughout the year.

3.3.2 Potential Impacts

The primary criterion for determining the project's effect is the VQO that will result from the proposed action (i.e., implementing one of the project alternatives). Failure to achieve the VQO specified in the management guidelines would result in an "adverse" effect. Achievement of the specified VQO would result in a "neutral" effect, and achievement of a VQO higher than that specified would result in a "beneficial" effect.

The visual simulations presented in this section are of the view from the picture window at Timberline Lodge. When viewing the visual simulations included in this section, it is important to note that the simulations have been based on US Geological Survey (USGS) 7.5-minute quadrangle contour lines and use the 10-meter grid digital elevation model (DEM) provided by

the FS. The simulations are intended to best represent future conditions for both Action Alternatives using the available information. The actual appearance of the quarry upon completion of expansion may vary from the visual simulations.

3.3.2.1 Alternative 1

Visual simulations from Timberline Lodge of Alternative 1 in winter and summer conditions are shown on Figure 5 and Figure 6, respectively. They depict two visible areas of the expanded quarry. The simulations present a worst-case scenario in that they show the expansion at its maximum limits, with no revegetation, even though the reclamation plan requires the importation of topsoil and revegetation of the site. The photograph used in the winter simulation was intentionally taken on a clear winter day to intensify the potential contrast in color between the snowy white quarry openings and the surrounding forest canopy.

When compared against the existing landscape character, Alternative 1 would result in low contrast in form and line, and low contrast in texture. Color contrast would be high in winter and moderate in summer. The form, line, and texture of the proposed expansion would be generally consistent with other openings in the viewshed. Although contrast in color would be high, the openings would mimic the appearance of Trillium Lake in winter conditions. Contrasts in color would likely become negligible as the reclamation plan to establish vegetation is successfully executed. Reclamation could occur in stages, so that portions of the quarry would be revegetated as the rock source is exhausted.

Under Alternative 1 (as with Alternative 2), a reclamation plan has been developed by the FS and ODOT, and would be implemented and updated as expansion occurs. Overburden soil has been and would continue to be saved for use during later reclamation of the quarry. The soil would be pushed back into the quarry benches and floors and planted with erosion-preventing, native grasses and other vegetation when the excavation is completed. Portions of the quarry would be reclaimed in stages, as detailed in the final quarry reclamation plan.

Given the distance of approximately 5.7 miles from Timberline Lodge to the quarry, it is not likely that batching and stockpiling operations or equipment could be observed with the naked eye. Ample opportunity exists at the quarry to keep batch facilities and stockpiles screened from view using topography. The haul route is not visible from the lodge, so no effect is anticipated from additional traffic along the haul route. Dust from rock extraction, crushing, screening, batching, loading, and hauling would cause localized air quality impacts to the Trillium Lake basin area. FS road 2656 is paved. The amount of dust created would be minimized by sprinkling when necessary, so dust would not create significant adverse visual impacts. The distance from the lodge to the quarry further reduces the likelihood of visual impacts from dust. It is highly unlikely that exhaust from equipment would cause a plume that would be visible from Timberline Lodge, as typically exhaust plumes do not appear unless there is a large concentration (more than 20) of heavy vehicles that are idling simultaneously in one location (Moore, M., pers. comm., 2004). ODOT would have fewer than a half-dozen vehicles operating at any one time.

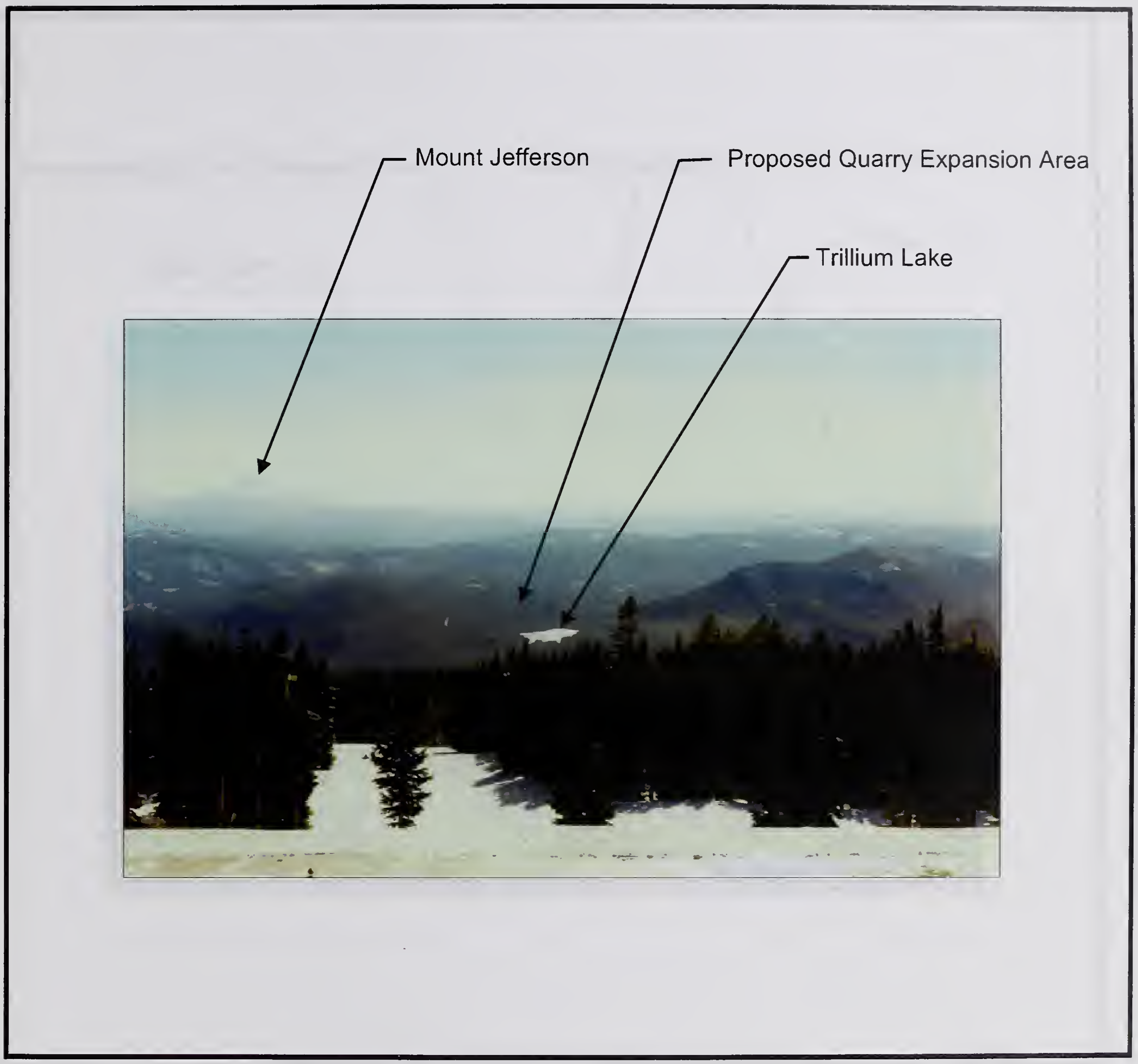


Figure 3
Wintertime View from Timberline Lodge

Figure 6
Visual Simulation of Alternative 1 in Summer

The existing quarry is visible from the Sherar Burn huckleberry and bear grass harvesting area, and the proposed expansion would create more of a visual impact to users' experience. Due to the lack of trees in the Sherar Burn area and the topography between that area and the quarry, views of the quarry from Sherar Burn could not be screened. As reclamation of the quarry is implemented, visual impacts would be reduced. Sherar Burn is not a key viewing area.

The expanded quarry would not be visible from Trillium Lake, the campground, or the dam—or the Salmon River corridor. Vegetation and topography would screen views of the quarry from these areas.

In the short term, Alternative 1 would not directly affect the scenic environment because it would be approximately 10 to 15 years before the quarry expansion would daylight into the knoll and sideslopes that currently screen the quarry from the lodge. Long-term effects to the scenic environment, when compared to the existing landscape character, would be consistent with the VQO of Partial Retention (evidence of human activities is permissible, but is subordinate to characteristics of the natural landscape). Even though the quarry expansion area would be partially visible, it would be subordinate to the characteristics of the natural landscape.

3.3.2.2 Alternative 2

Visual simulations from Timberline Lodge of Alternative 2 in winter and summer conditions are shown on Figure 7 and Figure 8, respectively. They depict two small areas of the expanded quarry that appear as horizontal slivers on the landscape. Similar to Alternative 1, the winter simulation (Figure 7) also presents a worst-case scenario in that it shows the expansion with no revegetation and in bright, winter conditions.

While the simulation indicates that small portions of the expansion would be visible, the level of detail in the 10-meter DEM and USGS contour information used to model the simulations makes it very difficult to determine the exact line at which the expansion would become visible. The resolution of the available information is not high enough to enable an exact determination, but it does provide a good estimate of where that line might occur. Because the intent of Alternative 2 is to expand the quarry to a point just before it would become visible from the key viewing area (Timberline Lodge), monitoring the expansion to determine visibility from the lodge is discussed as a mitigation measure in Section 3.3.3.

For the purposes of this study, the visual impact analysis for Alternative 2 is based on the simulations in Figure 7 and Figure 8. It is anticipated that the actual impacts would be less than shown in the simulations because the expansion would be monitored and revised so as not to be visible from Timberline Lodge.

When compared to the existing landscape character, Alternative 2 would result in low contrast in form and line, moderate to low contrast in color, and low contrast in texture. The form, line, and texture of the proposed expansion would be generally less obtrusive than other openings in the viewshed. The contrast in color would be moderate to low because the extent of the impact would

be relatively small when compared to other openings such as Trillium Lake and clearcuts. Although the visible clearcuts were harvested 10 to 20 years ago, they have been slow to revegetate, and still present a contrast in color. In winter conditions, the quarry openings would also be similar in appearance to Trillium Lake. Contrasts in color would likely become negligible as the reclamation plan to establish vegetation is successfully executed. Reclamation could occur in stages, so that portions of the quarry would be revegetated as the rock source is exhausted.

Given the distance of approximately 5.7 miles from Timberline Lodge to the quarry, and the fact that most of the landform screening the expansion would be left in place, it is unlikely that batching and stockpiling operations or equipment would be visible. The proposed haul route is not visible from the lodge, so no effect is anticipated from additional traffic along the haul route.

Based on the simulation, the proposed action would not directly affect the scenic environment in the short term because it would be approximately 10 to 15 years before expansion activities breached the area visible from Timberline Lodge. Long-term effects to the scenic environment, when compared to the landscape character in 10 to 20 years, would be minor, if not negligible.

In summary, based on the visual simulations, Alternative 2 would meet the VQO of Partial Retention (evidence of human activities is permissible, but is subordinate to characteristics of the natural landscape) and would be less visible than Alternative 1. Furthermore, if mitigation measures to monitor and revise the expansion area are implemented, the quarry would not be visible from Timberline Lodge.

The existing quarry is visible from the Sherar Burn huckleberry and bear grass harvesting area, and the proposed expansion would create more of a visual impact to users' experience, although less of an impact than Alternative 1. Due to the lack of trees in the Sherar Burn area and the topography between that area and the quarry, views of the quarry from Sherar Burn could not be screened. As quarry reclamation is implemented, visual impacts would be reduced. Sherar Burn is not a key viewing area.

As with Alternative 1, the expanded quarry would not be visible from Trillium Lake, the campground, or the dam, or the Salmon River corridor, because vegetation and topography would screen the quarry from view.

3.3.2.3 No Action Alternative

Under this alternative, the FS would expand the quarry from its current size of approximately 22 acres to the existing permitted boundary of approximately 29 acres. Blasting, crushing, screening, batching, and loading would occur as with Alternatives 1 and 2. Based on the available information and modeling, the expansion area would not encroach far enough into the knoll and sideslopes for the No Action Alternative to be visible from Timberline Lodge. Therefore the No Action Alternative would meet the VQO of Partial Retention and have a neutral effect.

As noted above, the existing quarry is visible from the Sherar Burn area, and the expansion that would occur under the No Action Alternative would increase visual impacts to users' experience.

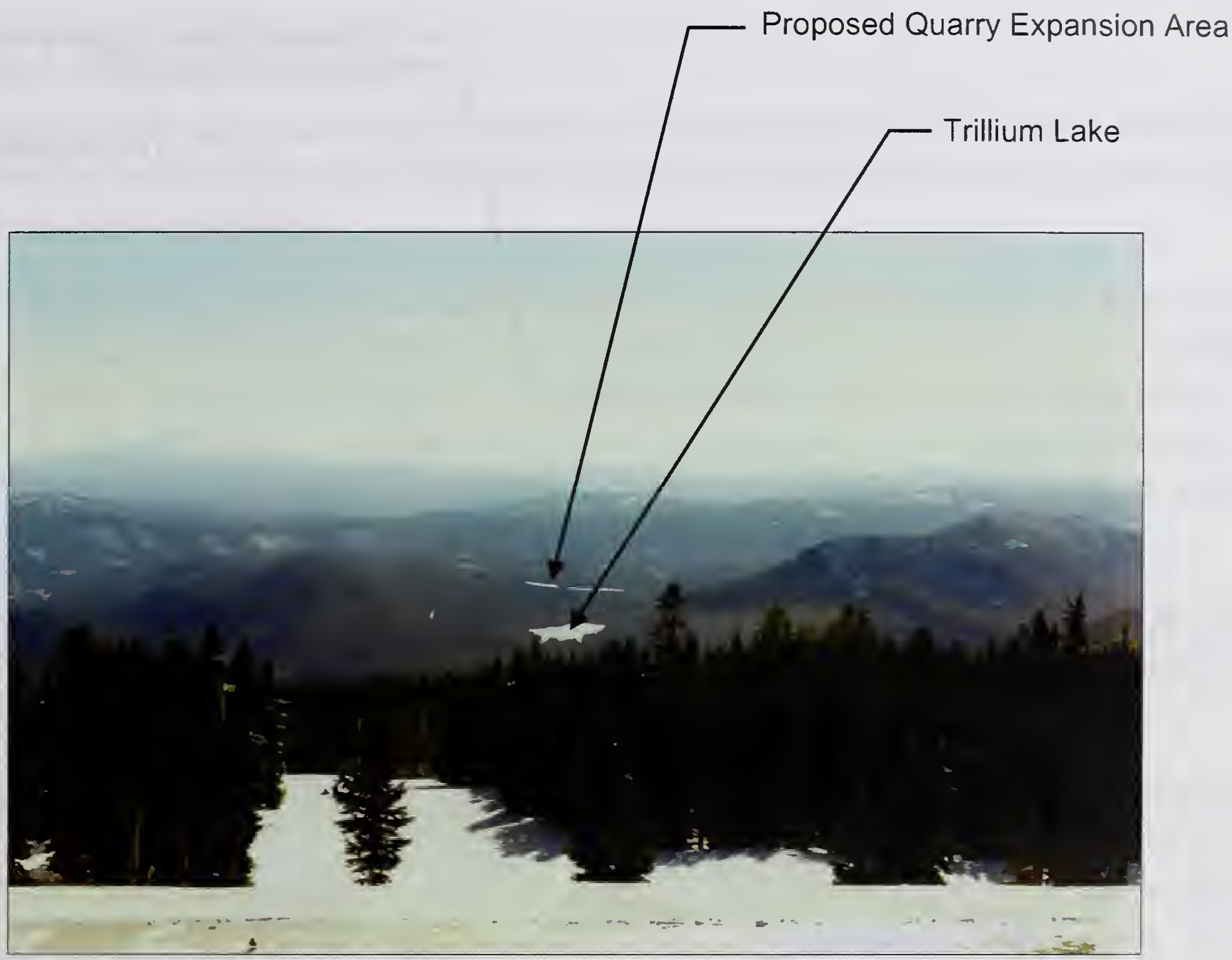


Figure 7
Visual Simulation of Alternative 2 in Winter

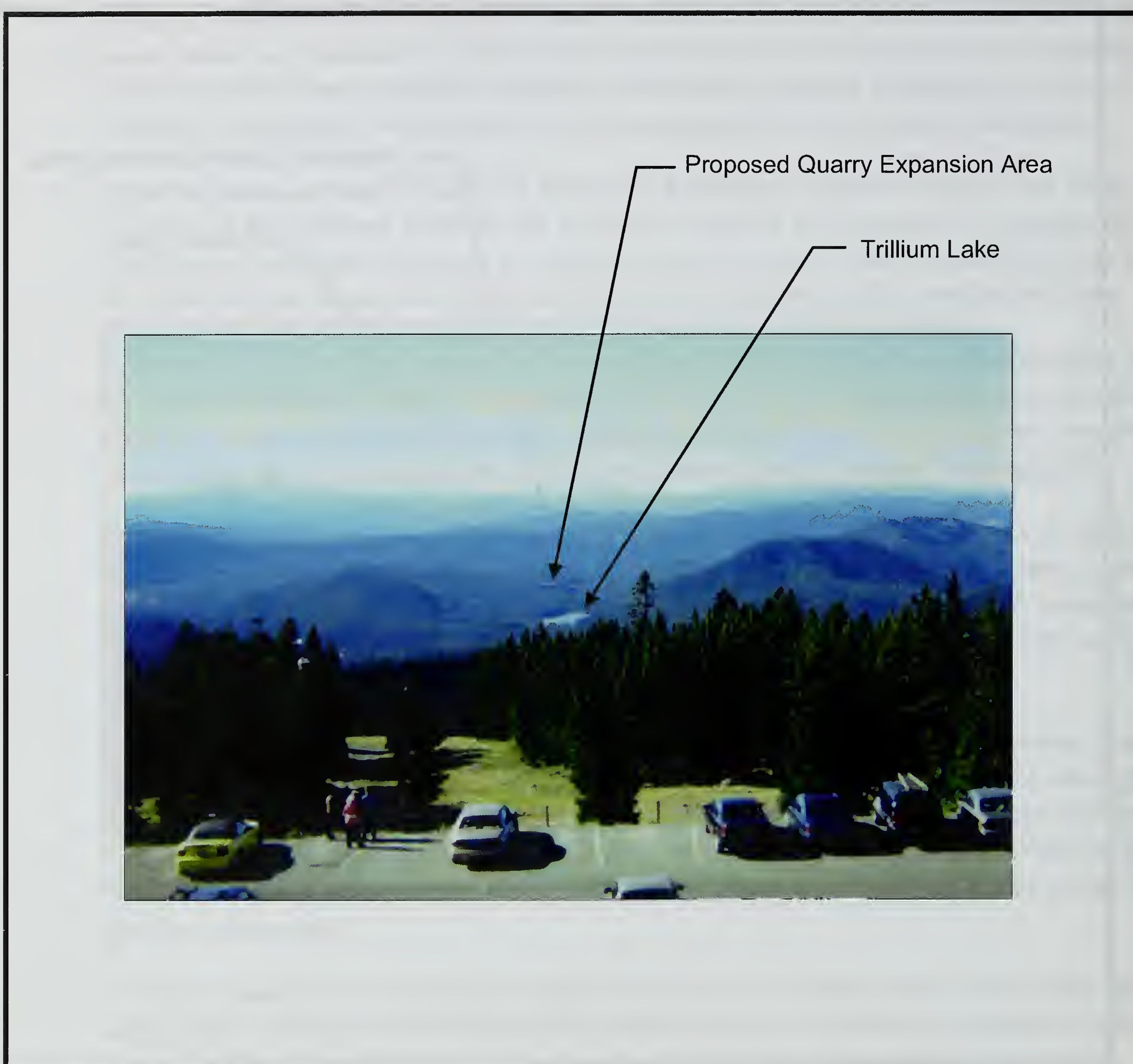


Figure 8
Visual Simulation of Alternative 2 in Summer

However, the impacts would be much less than under the Action Alternatives. Views of the quarry from Sherar Burn cannot be screened, but as quarry reclamation is implemented, visual impacts would be reduced. Sherar Burn is not a key viewing area.

The quarry would not be visible from the Salmon River corridor, or from Trillium Lake and its associated campground and dam because of topography and vegetation.

3.3.3 Mitigation Measures

Although both proposed Action Alternatives would meet the VQO of Partial Retention, the following mitigation measures could be implemented to mitigate and/or reduce potential impacts to the scenic environment.

1. Monitor expansion from Timberline Lodge to determine when impacts are becoming visible. The expansion project would take an extended period of time and would be accomplished in phases. Monitoring the success of reclamation efforts would help determine actual visual impacts by showing if reclaimed areas have been successfully re-vegetated before new areas are opened and become visible from Timberline Lodge. Monitoring the actual expansion footprint from the lodge would help determine where the limits of visibility occur.

2. Locate processing equipment and batching facilities on the lower levels of the quarry. Existing topography and vegetation could screen equipment and facilities placed on the quarry floor from view.

3. Augment forest cover on the north side of the expansion area. Supplementing existing vegetation with additional plantings would, in time, provide a screen for portions of the expansion area. The area would be planted when specific quarry development plans are proposed for the northernmost portion of the expansion area. Planting plans would be coordinated with a FS wildlife biologist to meet wildlife goals for the area.

3.4 TRANSPORTATION/ACCESS

3.4.1 Existing Conditions

The haul route to Tamarack Quarry is approximately 3.1 miles long and includes FS roads 2656 and 2656-955. FS road 2656 is surfaced with asphalt. FS spur road 955 is gravel surfaced. Both roadways are narrow with limited sight distance at several locations. Recreational users of Trillium Lake and surrounding areas generate the majority of traffic on FS roads 2656 and 2656-955. People recreating in the Trillium Basin use FS road 2656 for a variety of activities. Traffic includes large recreational vehicles (RVs) and automobiles as well as bicyclists and pedestrians. Many families and children camping in the area use the FS road 2656. The narrow roadway and limited sight distance make pedestrian and bicycle safety a concern.

Daily traffic counts on FS roads 2656 and 2656-955 are not available. However, use figures supplied by the Trillium Lake campground concessionaire show that in 2002, there were 17,078

campers during the year (Norman, pers. comm., 2003b). The Trillium Lake day use areas also are used heavily. The campground concessionaire reports that in 2002, there were 15,836 users (Norman, pers. comm., 2003b). Using a conservative assumption of two people per vehicle, 16,457 vehicles used the park facilities in 2002. Typical vehicle occupancy is likely to be higher than two people, which would mean that it is likely fewer vehicles used the facilities. The Trillium Lake campground is open and reservations are required from May 22 through September 2. Dispersed camping is available north of Trillium Lake at the intersection of Trillium Lake Road with Summit Meadows Road. Being recreational in nature, the majority of traffic on FS road 2656 and 2656-955 occurs Friday through Sunday and on holidays. Weekday traffic volumes on FS roads 2656 and 2656-955 is minimal. Average Daily Traffic (ADT) on US 26 east of Government Camp is 7,000 vehicles, which is well below the capacity of the roadway. Historical traffic counts indicate that traffic is growing at a compound growth rate of 1.5 percent per year.

The 2002 crash rate for US 26 in the vicinity (MP 54.23 to MP 57.52) of FS road 2656 (MP 55.74) is 0.53 crashes per million vehicle miles, which is below the statewide average for similar urban highways of 0.84 crashes per million vehicle miles. There are no locations on the Safety Priority Index System top 10 percent list.

3.4.2 Potential Impacts

3.4.2.1 Alternative 1

Expansion of the quarry would not change FS roads 2656 and 2656-955. No improvements would be made to the haul route except for routine maintenance, which may include resurfacing, structural repairs, striping, placement of safety reflectors, and placement of additional traffic signs. ODOT would pay for a commensurate portion of haul route maintenance. Traffic control, which may include flaggers and signs, would be implemented during hauling.

Under ODOT operation, activity at the Tamarack Quarry would increase. Activities would include clearing vegetation, blasting, rock crushing, screening, batching, loading and hauling, importing excess materials (e.g., from slides and ditch cleanings) for reprocessing or quarry reclamation, and short-term stockpiling of excavated rock and soils. Materials would be stockpiled on-site either for reprocessing or for use in reclamation. Sanding rock would be hauled out of the quarry and stockpiled at various locations: the junction of US 26 and OR 35, the Government Camp maintenance station, Bennett Pass, Parkdale, and the junction of OR 216 and US 26. Construction rock would be quarried as needed and used shortly after crushing.

During public and agency scoping for the proposed project, the potential for increased truck and recreation traffic conflicts was identified as a key issue. The amount of material to be removed each year could range from less than 40,000 cubic yards to more than 100,000 cubic yards. Conservative estimates show that quarry operations are expected to generate a total of 8,680 truck trips per year. Hauling could occur from mid-April through the first measurable snowfall (typically in November), except for emergencies. Daily truck traffic at the quarry could peak at

285 trips per day when all three types of hauling (sand stockpiling, general roadway construction, and emergency construction) are being conducted on the same day. Under this worst-case scenario there would be one truck entering or leaving the quarry every two minutes. On a more typical day of operation the quarry would generate only 53 trips per day, or 1 truck trip every 12 minutes. These levels of truck traffic would not have a significant impact on traffic operations along the haul route. ODOT truck traffic on US 26 in the larger Mt. Hood area may decrease as ODOT would not have to haul rock from out-of-area sites.

Except in emergency situations, which are expected to be uncommon, activities would not occur during the winter season, therefore there would be no impacts to winter recreation use in the area.

No noise-generating or hauling activities would occur during weekends (beginning at noon on Fridays) and holidays, when recreation uses peak. Traffic (hauling) conflicts with recreation use would occur on spring, summer, and fall weekdays. ODOT would post signs during hauling to warn recreational drivers of quarry traffic at intersections with the Trillium dam, the day use area access, the campground access, and the turnoff to the airstrip near Summit Meadows. With implementation of these measures, conflicts between truck and recreational traffic would be minimized.

Pedestrians and bicyclists often travel on the haul route, and there is a potential for conflict between those users and motorized vehicles. The FS currently plans to provide a trail along a portion of FS road 2656 to improve pedestrian and bicycle safety (see Chapter 4, Cumulative Effects). Hauling activity on the road could increase safety concerns.

To provide a better trail connection for mountain bikers and continued year-round use of the quarry for recreation, the FS would relocate the Quarry Connector trail around the quarry and maintain it for winter cross-country skiing and summer mountain biking use. The trail would be relocated prior to quarry expansion affecting the trail. ODOT would pay for the planning, design, and construction of the relocated trail. The trail could be designed with input from local mountain bike and back-country ski clubs. The route would be at a grade of less than eight percent with rest grades approximately every 200 feet to accommodate mountain bikers in the summer use season. It would be suitable for grooming with a snow groomer. Quarry operations would maintain the designed location and grade of the route into the future.

As noted in Section 3.4.1, bicycles and pedestrian traffic as well as motorized vehicles use the road. The narrow roadway and limited sight distance, combined with the mix of recreation traffic and large trucks (accessing the quarry) would increase safety concerns on the haul route.

3.4.2.2 Alternative 2

Although ODOT expects to extract less rock under Alternative 2 as Alternative 1, rock would be extracted and processed as needed under either alternative, and the annual number of truck trips would be similar under both Action Alternatives. Therefore, the impacts of Alternative 2 would be similar to those of Alternative 1.

3.4.2.3 No Action Alternative

Under the No Action Alternative, the FS would continue to use the quarry occasionally for rock extraction operations.. Since ODOT's contractor would have to haul rock from out-of-area sites, implementation of the No Action Alternative would result in trucks traveling more miles on US 26 in the Mt. Hood area than under one of the Action Alternatives.

Because the quarry would be expanded to existing permitted boundaries, the No Action Alternative would affect the Quarry Connector trail. The trail would be relocated, as described for Alternative 1.

3.4.3 Mitigation Measures

Levels of truck traffic expected to be generated by either Action Alternative would not have a detrimental impact on traffic operations along the haul route. Therefore, no mitigation measures for motor vehicle traffic would be required. Quarry operations (including hauling) typically would not occur during weekends and holidays; ODOT would implement traffic control measures to minimize traffic conflicts. These project design features would minimize traffic conflicts in the area. However, to mitigate potential safety issues between pedestrians/bicyclists and additional truck traffic, the following mitigation measure would be implemented.

1. ODOT would contribute $30,000 toward development of a pedestrian/bicycle trail along the haul route from Government Camp to Trillium Lake. The FS plans to develop the trail as part of a separate action, as described in Chapter 4 (Cumulative Effects).

3.5 RECREATION

3.5.1 Existing Conditions

The Trillium Lake area is one of the most popular recreation sites on the Forest (Pelles-Madrid, pers. comm., 2003). Summer is the busiest season, but the area is used year-round. The typical spring/summer/fall season runs between April 15 and November 15, with peak use during Memorial Day weekend and between June 15 and September 7. Primary access is via FS road 2656. A Forest Order requires that the road be closed to motorized vehicles when the gates are closed. (The gate is approximately 50 feet south of US 26.) The gates are generally closed by November 25 (depending on snow levels) and left closed until April 15. In high snow years, they are closed earlier; in low snow years they are closed later. The FS typically opens the gates or allows plowing of the road, if requested by owners of private property in the Forest or the campground concessionaire (1000 Trails), after April 15.

The Trillium Lake Campground is approximately 1.5 miles from Tamarack Quarry, on the eastern shore of Trillium Lake. The campground contains 57 campsites with water, restrooms, and a boat launch. No motors are allowed on the lake. Figures supplied by the campground concessionaire show that an average of 10,000 people camp at the campground each year (Walker, 2003). The concessionaire reports that in 2002 there were 17,078 campers (Norman, pers. comm., 2003b). The campground is open and reservations are required from May 22

through September 2. Dispersed camping is available north of Trillium Lake at the intersection of Trillium Lake Road with Summit Meadows Road.

The Trillium Lake day use areas also are used heavily. The campground concessionaire estimates that at least 5,330 vehicles and 12,000 people visit the Trillium Lake day use areas annually during the fee season (Walker, 2003). The concessionaire reports 15,836 users in 2002 (Norman, pers. comm., 2003b).

The two-mile-long Trillium Lake Loop Trail #761 is open May through October and is rated "easy." It loops around the lake with opportunities to view wildlife. Boardwalks take visitors through alpine wetlands (FS, 2003b). The $5 day use fee or a Northwest Forest Pass is required if visitors use the parking area. Only hiking is permitted (no horseback riding, mountain biking, or trailbikes). As of June 3, 2003, the trail is maintained and cleared of logs (FS, 2003c).

Winter trails (all roads covered with snow) in the area include the Trillium Lake Loop, the Mud Creek Loop, the Lost Man Connector, and the Quarry Connector. The Quarry Connector goes through the project area along the south and east sides. Quarry work in recent years has reduced the trail so that it is too steep for beginning-level cross-country (Nordic) skiers and mountain bikers (Walker, 2003). The quarry is open for recreational use except during operations.

The typical winter season runs between November 15 and April 15 and averages 10,000 users over that time period. Winter use is primarily on weekends and holidays (e.g., Thanksgiving and Christmas to New Year's Day). Activities that occur during the winter months are cross-country skiing and snowshoeing, among others. The Trillium sno-park is a parking area on the south side of US 26, accessed by FS road 2656. The Trillium sno-park is often full on weekends between December 15 and March 31, with 200 cars or more (Walker, 2003).

Hunting is regulated by the Oregon Department of Fish and Wildlife (ODFW). ODFW collects data by telephone surveys of a sample of tag holders. The project area is in Western Oregon, Cascades Area, Santiam Unit. The unit includes a large area of the northern Cascades, including portions of both the Mt. Hood and Willamette National Forests. The north boundary of the unit is the Columbia River; the south boundary is US 20. On the east the unit is bounded by the Multnomah and Clackamas county lines, OR 35, the Warm Springs Indian Reservation, and the Linn County/Jefferson County line. On the west, the unit boundary follows Highway 226, Highway 213, Cascade Highway, and OR 226 (ODFW, 1996). Although the area around Mt. Hood is an accessible and popular area for deer and elk hunting, in general there has been a slow but steady decline in hunting over the past 20 years (Hurtado, pers. comm., 2004). For the 2000 archery and rifle deer season (the most recent data available), ODFW reports 17,670 hunters hunted 116,816 hunter-days (average 6 days per hunter) in the Santiam Unit (ODFW, 2004). The rifle deer season typically lasts three weeks to a month during the month of October. Bull elk season in the Cascades is one week during October, during which hunting for deer is prohibited (Hurtado, pers. comm. 2004).

The majority of recreation in the Mud Creek drainage occurs between US 26 and the dam on Trillium Lake. FS road 2656 is used for vehicle access to the campgrounds and day use areas as well as pedestrian and bicycle use from Government Camp and nearby campgrounds.

3.5.2 Potential Impacts

3.5.2.1 Alternative 1

There would be no impacts to winter recreation, except if ODOT were to plow the haul route in emergency situations. Based on past experience, winter quarry access would be unlikely to occur, as neither ODOT nor the FS have accessed the quarry during winter months, even for emergency use (Beckman, pers. comm., 2005). The main portion of the Trillium Lake Loop is a popular cross-country ski trail, and winter plowing would displace this activity.

Conflicts with spring, summer and fall recreation use, including traffic conflicts (hauling) and noise conflicts (blasting after July 15, crushing, screening, batching, and hauling) would occur on weekdays. Since recreation data separating weekend from weekday use is not available, impacts to spring, summer, and fall weekday use cannot be quantified. However, noise from operations would impact weekday recreation. Levels of truck traffic expected to be generated by either Action Alternative would not have a significant impact on traffic operations along the haul route. In addition, in order to minimize traffic conflicts, ODOT would post signs during hauling to warn recreational drivers of quarry traffic at intersections with the Trillium dam, the day use area access, the campground access, and the turnoff to the airstrip near Summit Meadows.

Although quantitative impacts on hunting cannot be assessed since ODFW collects data only for the Santiam Unit as a whole, the Mud Creek area is popular for hunting. Noise from blasting, crushing, and hauling would impact hunting, as these operations would occur in October, during both rifle deer and bull elk seasons.

The quarry would remain open for recreation use except during blasting and hauling operations, therefore there would be no permanent loss of acreage for dispersed recreation. ODOT would post signs closing the quarry to recreation during operations.

Quarry expansion under Alternative 1 would affect the existing Quarry Connector trail. Public and agency comments identified this as a key issue during the scoping process. To provide a better trail connection and continued year-round use of the quarry for recreation, the FS would relocate the Quarry Connector trail around the quarry and maintain it for winter cross-country skiing (suitable for beginner to intermediate skiers) and summer mountain biking use (suitable for intermediate bikers). The trail would be relocated prior to quarry expansion affecting the trail. The trail could be designed with input from local mountain bike and back-country ski clubs. ODOT would pay for the trail relocation. The route would be at a grade of less than eight percent with rest grades approximately every 200 feet to accommodate mountain bikers in the summer use season. It would be suitable for grooming with a snow groomer. Quarry operations would maintain the designed location and grade of the route into the future.

3.5.2.2 Alternative 2

The impacts of Alternative 2 would be similar to those of Alternative 1, described above.

3.5.2.3 No Action Alternative

Under the No Action Alternative, the FS would extract the remaining estimated 750,000 cubic yards of rock in the permitted area. The frequency and duration of noise impacting recreation users, including hunters, is expected to be less than under the Action Alternatives, using the assumption that the FS would extract up to 10,000 cubic yards per year). During periods of quarry use, noise intensity could be equal to that under the Action Alternatives. Trucks would continue to haul material along the haul route. As this occurs under current conditions, no additional impacts would be anticipated.

The Quarry Connector trail would become too dangerous for use under the No Action Alternative. Extracting rock from the remaining seven acres of permitted area would cause dangerous conditions, as the trail runs along the edge of the permitted area boundary. The trail would be relocated as described under Alternative 1, above (Section 3.5.2.1). The Trillium Lake Loop cross-country ski trail would not be impacted by plowing the haul route, except when quarry use is needed for emergency road repairs.

3.5.3 Mitigation Measures

Levels of truck traffic expected to be generated by any of the alternatives would not have a significant impact on traffic operations, and therefore would not cause significant traffic conflicts, along the haul route. As part of the proposed project, quarry activities would be limited to daytime, weekday hours. No truck hauling is to occur when the gates are closed for winter (typically November 25 to April 15) except for emergencies. No additional measures are feasible to mitigate noise impacts on recreation users.

3.6 THREATENED, ENDANGERED AND SENSITIVE WILDLIFE SPECIES

3.6.1 Existing Conditions

The Salmon River watershed provides potential habitat for more than 230 species of wildlife. The watershed also provides special habitats including wetlands, rock outcrops, talus slopes, cliffs and waterfalls (FS, 1995). Vegetation in the watershed was classified into stand structure classes for the Salmon River Watershed Analysis. Structure classifications were based on tree size and canopy closure. Two levels of structural categories were used in this analysis:

- Coarse level split into Open, Small Conifer, and Large Conifer.
- Finer breaks based primarily on canopy closure within these three classes.

Open: Vegetated areas that currently function as openings. These include:

- Grass/forb/shrub (GFS) (including grass/forb/shrub/advanced): Dominated by early seral vegetation and tree seedlings with less than 40 percent total tree canopy cover.

- Open Sapling/Pole (OSP): sapling and pole size trees dominate (less than 9 inches dbh) and canopy cover is 70 percent or less. Shrubs may be well established.

Small Conifer: Stands that have tree canopy closure over 40 percent and are dominated by tree sizes between 9 and 21 inches dbh, or sapling/pole stands over 70 percent closure. These stands include:

- Closed Sapling Pole (CSP): trees up to 9 inches dbh dominate the stand; canopy closure is greater than 70 percent. Early-seral understory vegetation begins to decline .
- Open Small Conifer (OSC): trees 9 to 21 inches dbh dominate the stand; canopy closure is 70 percent or less.
- Closed Small Conifer (CSC): trees 9 to 21 inches dbh dominate the stand; canopy cover is over 70 percent. A range of stands are represented—from dense young single-story stands with little understory vegetation to older stands with multiple layered canopies.

Large Conifer: Stands that have tree canopy closure of 40 percent or more and are dominated by trees greater than 21 inches in diameter. These stands include:

- Open Large Conifer (OLC): trees over 21 inches dbh dominate the stand, and canopy cover is 50 percent or less.
- Closed Large Conifer (CLC): trees over 21 inches dbh dominate the stand and canopy cover is over 50 percent.

Over 50 percent of the expansion area is composed of GFS stands with the remaining 50 percent of the expansion area are in the CSC structure stage. Within the CSC stands remnant late seral Douglas-fir and western hemlock trees occur. A majority of these trees are snags in various states of decay.

3.6.1.1 Threatened and Endangered Species

There are two federally listed threatened wildlife species identified by FS as having the potential to occur within the project area: the northern spotted owl (*Strix occidentalis caurina*) and the bald eagle (*Haliaeetus leucocephalus*). The FS has not identified any federally listed endangered species in the project area.

The northern spotted owl is a federally listed threatened species. Throughout their range and during all seasons, spotted owls consistently concentrate their foraging and roosting in old-growth or mixed-age stands of mature and old-growth trees. A variety of nest structures have been used, but most spotted owl nests on the Mt. Hood National Forest have been found in old-growth stands. The FS has mapped suitable spotted owl nesting, roosting, and foraging (NRF) habitat across the forest based on aerial photograph interpretation. No NRF habitat was identified in the project area on the map and a field reconnaissance of the proposed expansion area confirmed that

the project area does not provide suitable NRF habitat for spotted owls. The project area, at best, serves as dispersal habitat. A historic spotted owl nest site is located over 0.5 mile but within 1.0 mile of the project area in the Mud Creek drainage. The USFWS recently completed a 5-year status review of the northern spotted owl to determine if the species is under any new threats since its original listing as a threatened species in 1990. The study concluded that many factors still exist that affects the viability of the spotted owl populations throughout its range. Although the continued loss of NRF habitat was cited as a continued threat, no information in the status review directly applies to the project area due to the absence of NRF habitat and the unlikelihood of project area becoming NRF habitat in the future due to poor site conditions. A biological assessment was completed to assess the impact to the northern spotted owl. Refer to Appendix D.

Bald eagles, a federally threatened species, are found along the shores of saltwater and freshwater lakes and rivers. They occur throughout the state during the non-breeding season and may occur in the project area during this period. In Oregon, bald eagle nests are generally located within one mile of water (Marshall et al., 2003). Trillium Lake, located over a mile north of the quarry, provides the closest potential habitat. The lake is seasonally stocked with fish but may not provide a consistent prey base for bald eagles. The proposed quarry expansion area does not provide suitable nesting habitat for bald eagles. There are no known bald eagle nests within one mile of the project area (Isaacs and Anthony, 2004). Winter use of the project area is unlikely since bald eagles congregate in areas of abundant forage and low human disturbance. Due to its elevation at 3,601 feet, Trillium Lake may freeze during the winter, limiting forage opportunities. The recreational use within the project vicinity is high, which would further limit bald eagle use of this area.

The Mt. Hood National Forest currently has no mapped Canada lynx habitat. The best available data indicate that the Canada lynx is currently not present on the Forest. Without the presence of lynx and without lynx habitat, consultation under section 7(a)(2) of the ESA would be concluded with a determination of no effect (Dyck, 2003).

3.6.1.2 Sensitive Species

There are 16 wildlife species on the Regional Forester's Sensitive Species List for the Mt. Hood National Forest. Of these 16 wildlife species, California wolverine, Pacific fringe-tailed bat, Pacific fisher, Larch Mountain salamander, and Oregon slender salamander may occur within the project area. Refer to Appendix C for more discussion of these species. Wolverines are known to occur on the Zigzag Ranger District and are believed to prefer secluded areas with minimal disturbance. Due to the level of year round human disturbance within the project vicinity, wolverines are unlikely to remain in the area. However, this species may travel through the Mud Creek catchment. Pacific fringe-tailed bats are typically associated with caves, mines, and buildings but may use snags for day roosts. This species may forage along the roads in the project area. The snags and down wood in the project area could provide habitat for Pacific fisher, Larch Mountain salamander, and Oregon slender salamander.

3.6.1.3 Northwest Forest Plan Species

The *Record of Decision for Amendments to the Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl* (FS and BLM, 1994) provides direction for surveying for survey and manage species. The direction was modified by the 2001 Survey and Manage ROD (FS and BLM, 2001) as described in Section 1.7.2.

Surveys were conducted for terrestrial mollusks and an amphibian that were identified as survey and manage species, but no individuals were found. Although no surveys were conducted for the bats, the remnant old trees within the project area most likely provide roosting and foraging habitat. The surveys were conducted in accordance with the 2001 Survey and Manage ROD.

Refer to Appendix C for more discussion of these species.

3.6.1.4 Management Indicator Species

The following species are classified as management indicator species for the Mt. Hood National Forest: black-tailed deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), marten (*Martes americana*), and pileated woodpecker (*Dryocopus pileatus*). All of these species are most likely present in the project area. The large diameter snags within the project area would provide habitat for the marten and pileated woodpecker. The project area also provides summer thermal cover and foraging habitat for deer and elk. Deer and elk are regulated and managed by ODFW. The project area is within the Santiam Unit and according to their website population levels are stable to increasing for both species within the Santiam management unit. The migration and feeding movements of both species are to the south of the project area and the project area does not appear to be utilized to any large extent as cover or forage. The most recent annual monitoring reports indicate that remote camera and tracking surveys have documented strong presence of both pileated woodpeckers and pine martens and that their populations appear viable (FY02 report page 76, FY03 report page 67). Refer to Appendix C for more discussion of these species.

3.6.2 Potential Impacts

3.6.2.1 Effects Common to Alternative 1 and Alternative 2

3.6.2.1.1 Threatened and Endangered Species

No northern spotted owl NRF habitat would be removed in conjunction with this project. However, there is suitable NRF habitat within one mile of the quarry and 0.25 mile of the haul route. These distances were used to evaluate potential disturbance to nesting spotted owls and is based on the Programmatic Biological Assessment for Activities with the Potential to Disturb Northern Spotted Owls and/or Bald Eagles in the Willamette Province for FY 2002-2003 (BLM and FS, 2002). Since surveys were not conducted for this project, the adjacent NRF habitat is assumed to be occupied for the purposes of determining impacts. Depending on the selected alternative, up to 48 acres of dispersal habitat may be removed to expand the quarry.

The proposed project would generate noise above local ambient levels when the quarry is in operation. The sources of the noise would include blasting, rock crushing, bulldozers or similar type equipment to move rock within the quarry, and load trucks. The duration of these activities would depend on the need for rock over the next 20 years. There are two known ODOT road construction projects on OR 35 scheduled to begin in summer 2005 that would require rock from the quarry. Sanding rock would be needed for the winter of 2005. Noise-generating quarry operations, except blasting, would occur on weekdays (Monday at 7:00 a.m. through Friday at noon, except holidays) from mid-April to the first measurable snowfall (typically in November). ODOT would plow the haul route open in April and May.

Blasting would begin after July 15 to minimize disturbance during the critical nesting period for spotted owls of March 1 to July 15. Although no NRF habitat would be removed, dispersal habitat would be removed, and the blasting could disturb nesting spotted owls after the critical nesting period. Therefore, the determination is that this project **may affect,** but is **not likely to adversely affect** the northern spotted owl.

Neither Alternative 1 nor 2 would have an effect on bald eagles. Neither Action Alternative would remove bald eagle nesting, winter roosting, or foraging habitat. It is assumed that project noise would not impact non-breeding eagles.

3.6.2.1.2 Forest Sensitive Species and survey and manage

Timber removal would occur in the expansion area but the rate of the removal would occur slowly over 20-year period. No specific expansion plans have been developed, as the expansion would occur as needed. The stands within the expansion area are predominantly open canopy, early seral habitats. The removal of these stands and other structural stage classes present in the expansion area comprise less than a one percent reduction of each of these structures within the watershed. For example, 28,069 acres of the watershed are stands classified as closed small conifer structure class. Alternative 1 would remove only seven acres of this stand structure and Alternative 2 would not remove any stands within this stage class. No late seral structural classes occur in the project area.

The expansion area contains mature, remnant (over 21 in dbh) snags and downed logs. The Salmon River Watershed Analysis states that snag density in the watershed is low overall due to past high intensity fires and past management practices (FS, 1995). Snag density is low in the Mud Creek subwatershed, however the subwatersheds adjacent to the expansion area (East and West Forks and Upper Salmon River) have a high density of large snags.

Both Alternatives 1 and 2 would remove snag and large down woody debris habitat in the expansion area that may impact sensitive species such as the Pacific fringe-tailed bat and the Pacific fisher. Higher quality habitat for wolverine and fisher occur in the adjacent East and West Forks subwatershed and in the Mt. Hood Wilderness in general. Potential suitable habitat exists in the expansion area for the Larch Mountain salamander, and Oregon slender salamander. Surveys were conducted for these species to FS protocol, and no individuals were located. The

implementation of either Action Alternative would remove habitat for these species. This loss of habitat is offset by higher quality adjacent habitat outside of the project area and Matrix land allocations. This adjacent habitat in protected wilderness areas and meadow complexes is expected to provide the primary suitable habitat for listed wildlife species.

3.6.2.1.3 Mt. Hood National Forest Plan Management Indicator Species

As discussed above, both Action Alternatives contain habitat (snags and downed wood) for marten and pileated woodpeckers and summer thermal habitat for black-tailed deer and elk. This would be impacted by timber removal; however, in the case of pine marten and pileated woodpecker not only is there suitable adjacent habitat but the LRMP management areas (B5) are retained for this watershed and managed for these species.

Noise from quarry operations may deter or limit deer, elk, marten, and pileated woodpecker use of the surrounding habitat within the project vicinity. The duration and intensity of the noise from crushers and blasting is not expected to disturb species roosting, denning and foraging over 0.25 mile from the quarry. This threshold is documented in a recent USFWS white paper (Livezey 2003) in which noise from heavy equipment, helicopters and blasting are not documented to disturb species present over 120 yards away. Blasting can cause disturbance up to a mile away. For this reason blasting would not occur until after July 15 to minimize disturbance to spotted owls; this would also minimize disturbance to deer and elk calving areas in the riparian areas of Mud Creek. Deer and elk wouldbe rearing young when blasting is set to begin in mid-July but the high quality rearing areas are over a mile away from the quarry and are not expected impacted by project activities.

3.6.2.2 No Action Alternative

In the event that the No Action Alternative is selected, the FS would still continue to operate the quarry under the existing permits. However, prior consultation for these activities has not occurred and informal consultation would need to be initiated prior to the next use of the quarry.

Quarry expansion and associated operations would be limited to the existing permitted boundary, which includes removal of up to seven acres. There would be no modification of NRF habitat but dispersal habitat would be removed. Quarry operations, rock haul, and road maintenance would be the same as the Action Alternatives stated above. Therefore, the No Action Alternative **may affect,** but is **not likely to adversely affect** the northern spotted owl.

The seven acres within the permit boundary do not include the levels of snags and down woody debris habitat found in the rest of the expansion area; therefore, it is not expected that expanding the quarry to the permitted boundary would impact sensitive or management indicator wildlife species.

3.6.3 Mitigation Measures

As part of the project design, blasting would not occur before July 15 to mitigate for potential impacts to northern spotted owls. In addition, all quarry operations would be limited to daylight hours only; mufflers would be on all equipment; a blasting and operation plan would be developed and the reclamation and spill response plan would be implemented. No other mitigation measures are required.

3.7 FISHERIES

3.7.1 Existing Conditions

The Salmon River Watershed contains both anadromous and resident fish species. Distribution of anadromous fish (chinook salmon, coho salmon, steelhead, and sea-run cutthroat trout) is limited to the lower portions of the Salmon River watershed. Lower Columbia River coho, Chinook, and steelhead Evolutionarily Significant Units and their critical habitat have all been listed under the Endangered Species Act. The closest stream to the Tamarack Quarry is Mud Creek, which is approximately 0.4 mile away. There is no hydrologic connection between the project area and Mud Creek. Mud Creek is a tributary to the Salmon River that has a natural anadromous fish barrier approximately 9 miles downstream of Trillium Lake.

Resident cutthroat and rainbow trout inhabit streams in the upper part of the watershed, which contains the project area. Both species are found within Mud Creek and the West Fork Salmon River (FS, 1995). Both are considered to be species of concern and are Mt. Hood National Forest management indicator species.

Habitat requirements for resident rainbow trout are similar to those for steelhead. Mud Creek is within the range of natural variation and within LRMP standards for pools. Most of the Mud Creek catchment has low to moderate large woody debris recruitment potential (in other words, there are not many large trees within approximately 100 feet of the creek). Stream temperatures in the Mud Creek drainage have been recorded as high as 19.3° C (66.7° F), above the threshold for adverse effects on rainbow trout. In 1995, approximately 58 percent of the riparian reserves within the Mud Creek catchment had less than 60 percent canopy closure. For these reasons, habitat in Mud Creek near the project is degraded due to a lack of pools and large woody debris (FS, 1995). Within Mud Creek the lack of large woody debris and relatively high stream temperatures may be attributed to historical harvest (more than 62 percent of the riparian reserves had received some kind of harvest activity). Habitat conditions are expected to improve because of implementation of the Northwest Forest Plan and the Aquatic Conservation Strategy (FS, 1995).

The resident cutthroat population is from native stock, and resident cutthroat are well distributed throughout the Salmon River Watershed. Habitat conditions for cutthroat trout in the Mud Creek Watershed are as described above for rainbow trout. Increased sedimentation in the upper watershed from road sanding activities is of concern because of the potential effects of sediment

deposition on redds (nests). Because sediment loads from road sanding are greatest during spring runoff, sanding has the greatest effect on reproduction of spring-spawning native trout and favors fall-spawning brook trout (FS, 1995).

Competition with brook trout and hybridization with introduced stocks of rainbow trout are also of concern. Brook trout compete for limited habitat and food resources, and prey on the eggs and larvae of other fishes. Rainbow trout releases in Trillium Lake allowed them to spread into Mud Creek, Salmon River and other mainstem tributaries and allows possible hybridization with native rainbow and cutthroat trout. It appears that if the hatchery fish are not harvested quickly they do not survive the following winter (FS, 1995).

Bull trout, a federally listed threatened species, may have historically occurred in the Sandy River Basin and Salmon River sub-basin, but its presence has not been confirmed. Suitable habitat and isolation exists to support this species in the upper Salmon River watershed (FS, 1995). Bull trout presence has also not been confirmed in Mud Creek. This is the closest stream to the Tamarack Quarry and is approximately 0.4 mile away. A natural fish barrier located on the Salmon River, approximately 9 miles downstream of Trillium Lake prevents anadromous fish from accessing Mud Creek.

The only fish species on the Regional Forester's sensitive species list that is suspected to occur in the Salmon River watershed is the interior redband trout (FS, 1995). Its closest potential habitat is over 0.4 mile from the quarry.

No habitat exists for FS sensitive invertebrate or aquatic mollusk species in the project area. The LRMP fish management indicator species for the project area are salmonids, but according to the standards and guidelines (FW-138), impacts on salmonids shall be determined for each project affecting fisheries, in terms of habitat quality, quantity, and distribution (FS, 1990).

3.7.2 Potential Impacts

3.7.2.1 Alternative 1

Based on field investigations, review of literature and data, and conversations with FS staff, the following determinations were made. Since the closest stream is 0.4 mile from the project area, Alternative 1 would have no effect on federally listed threatened bull trout. Alternative 1 would have no effect on any of the ESA-listed fish found the lower reaches of the watershed. Alternative 1 is expected to have no impact on the interior redband trout or anadromous salmonids. Anadromous salmonids cannot access the project area because of a natural fish barrier. Alternative 1 would not impact fish habitat quality, quantity or distribution, and would not affect Essential Fish Habitat.

3.7.2.2 Alternative 2

For the reasons given for the impacts of Alternative 1, Alternative 2 would have no effect on bull trout and no impact on interior redband trout or anadromous salmonids. Alternative 2 would not impact fish habitat quality, quantity, or distribution, or Essential Fish Habitat.

3.7.2.3 No Action Alternative

The No Action Alternative would have no impact or effect on any fish species or Essential Fish Habitat.

3.7.3 Mitigation Measures

No mitigation measures are proposed.

3.8 PLANT COMMUNITIES

3.8.1 Existing Conditions

The "Survey of Rare Vascular and Non-Vascular Plants, Fungi and Lichens for the Tamarack Quarry Proposed Expansion Area" (Salix Associates, 2003) provided the basis for the information on plant communities. FS search protocols were followed for all species and species groups. The Regional Forester's list, the Mt. Hood National Forest list, and the current Northwest Forest Plan survey list were referred to for identifying potential rare plants and fungi.

3.8.1.1 Threatened, Endangered, and Sensitive Species

Salix Associates conducted a survey for listed threatened, endangered, and sensitive (TES) species on July 24, 2003. No TES plants were located within the quarry expansion area.

Habitats encountered in the study area include: dry talus, mesic coniferous forest and moist coniferous forest. These habitats were searched thoroughly for TES species. No conks of noble polyphore were found; however, stumps and snags searched in the area provide suitable habitat. The study area is divided into seven plant communities, described in Table 3-3 and illustrated on Figure 9.

Area B (shown on Figure 9) may provide habitat for Gorman's aster (*Aster gormanii*), which is on the Mt. Hood National Forest list of sensitive plants. One leathery grapefern (*Botrychium multifidum*) was observed in Community E. The area provides potential habitat for *Botrychium* species.

More information on TES plant species is presented in Appendix E.

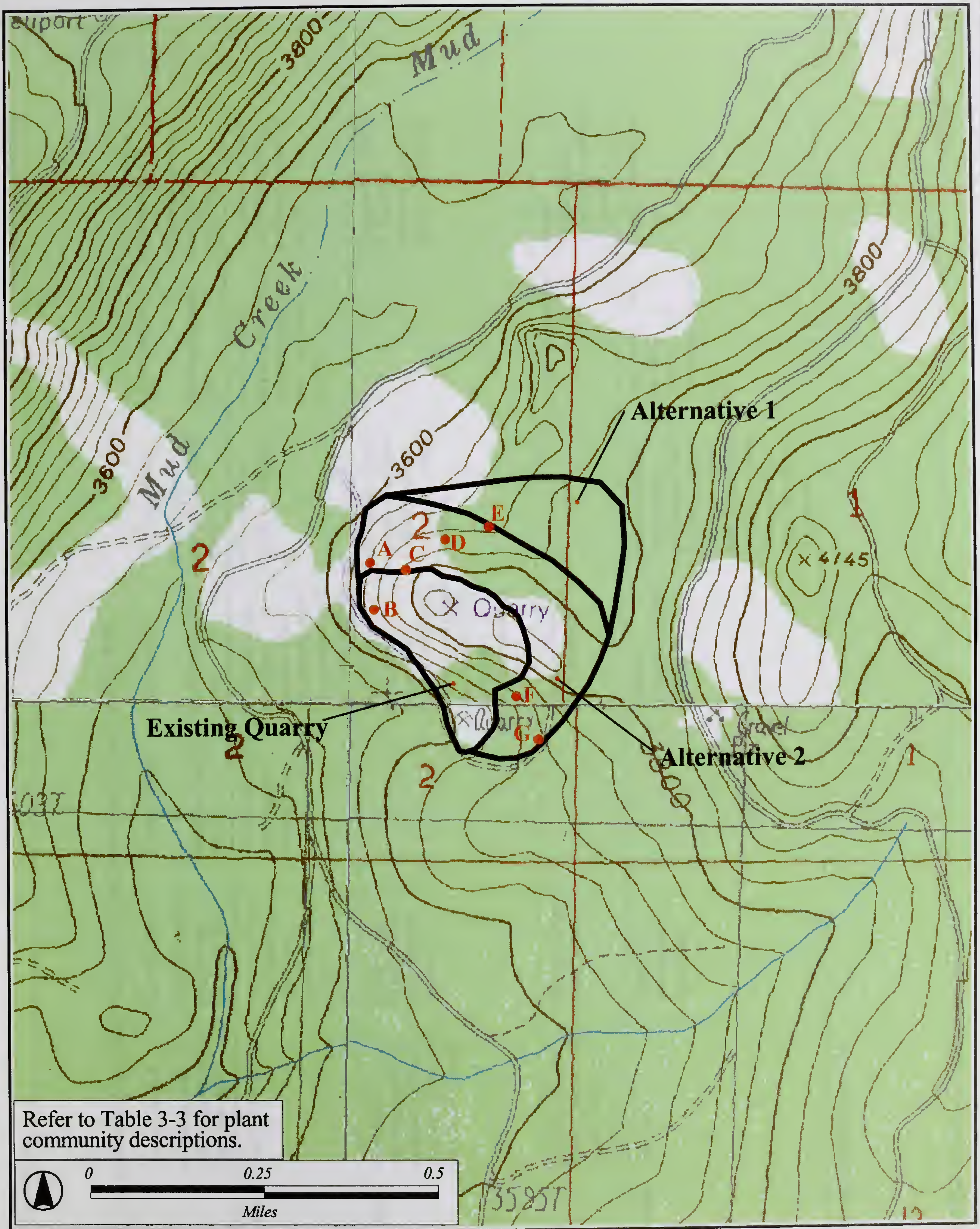


Figure 9

Vascular Plant Communities in the Tamarack Quarry Study Area

Table 3-3. Vascular Plant Communities in the Tamarack Quarry Study Area

	Community A **Northwest of quarry area, along Rd 2656-955**	**Community B** **West of quarry area, along Rd 2656-955**	**Community C** **North of quarry area**	**Community D** **North of quarry area**	**Community E** **Northeast portion of study area**	**Community F** **South of quarry area**	**Community G** **South of quarry area, along Rd 2656-955**
Character	Gentle west slope	Moderate west-southwest talus slope with scattered conifer cover	North-northwest undisturbed talus slope	Scattered large, old-growth conifers over a moderately dense intermediate layer of young conifers	Flat with small moist depressions	South aspect, mostly unforested, undisturbed dry talus, low plant diversity	Dry, second-growth conifer forest with scattered large old stumps
Tree Layer	Douglas-fir, western hemlock; and some silver fir, western white pine, western red cedar	Douglas-fir, western white pine, western hemlock		Old-growth dominants: Douglas-fir, western hemlock, western red cedar; intermediate layer dominants: western hemlock, silver fir	Old-growth, large snags, and dead-topped western red cedar, western hemlock		Douglas-fir, silver fir, western hemlock, some western white pine
Shrub Layer	Dense—Pacific rhododendron, vine maple, Alaska blueberry	Sparse—dwarf oceanspray,		Dense—Pacific rhododendron		Dwarf oceanspray	Pacific rhododendron, snowbrush, golden chinkapin
Herb Layer	Sparse	Sparse—penstemon, beargrass		Sparse—beargrass, alpine wintergreen	False bugbane, triangle-leaf groundsel, dwarf bramble, marsh marigold, lady fern, green false hellebore, stream violet, dwarf bramble, and bunchberry	Penstemon, very few small populations of Cascade parsley fern	Patchy beargrass

Source: Salix Associates, 2003

3.8.1.2 Northwest Forest Plan Species

The *Record of Decision for Amendments to the Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl* (FS and BLM, 1994) provides direction for surveying for survey and manage species. The direction was modified by the 2001 Survey and Manage ROD (FS and BLM, 2001) as described in Section 1.7.2.

Surveys for Northwest Forest Plan (survey and manage) species were conducted on July 24 and August 5, 2003 in accordance with the 2001 Survey and manage ROD. No survey and manage vascular plant, bryophyte, lichen, or fungus species were found during the surveys.

The bryophyte community is moderately developed and is dominated by terrestrial species. Commonly encountered bryophytes include: *Rhytidiopsis robusta, Dicranella varis, Dicranum* spp., and *Racomitrium* spp. Talus areas exhibited the highest levels of species richness. The lichen community also is only moderately developed and dominated by alecteriod (pendulous) and green-algal foliose taxa. In the study area, frequently encountered taxa include: *Alectoria sarmentosa*, *Bryoria* spp., *Hypogymnia* spp., and *Platismatia* spp. Cyano-lichens (nitrogen-fixing) are poorly represented and restricted to infrequently encountered thalli of terrestrial species in talus areas.

3.8.1.3 Noxious Weeds

Noxious weed surveys were conducted beginning at US 26 at the north end of the haul route, and along both sides of FS road 2656 and FS road 2656-955 into the quarry, for a total of a little more than three miles. Numerous locations of several noxious weed species were found and mapped along the haul route and in the quarry. These include Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), Scot's broom (*Cytisus scoparius*), foxglove (*Digitalis purpurea*), St. John's wort (*Hypericum perforatum*), birdsfoot trefoil (*Lotus corniculatus*), and reed canarygrass (*Phalaris arundinacea*). The locations of these are shown on Figures 10 and 11.

3.8.2 Potential Impacts

3.8.2.1 Alternative 1

Alternative 1 would be unlikely to impact any survey and manage plants, bryophytes, lichens, or other fungi as none were found in the area. Alternative 1 would remove vegetation in the identified plant communities as operations occur in the quarry expansion area. In addition, Alternative 1 would remove vegetation from the area surveyed as plant community E, which contains potential habitat for *Botrychium* species.

Additional discussion of potential impacts is in Appendix E.

3.8.2.2 Alternative 2

Impacts would be similar to those under Alternative 1, although Alternative 2 could be designed to avoid expanding the quarry into plant community E and therefore avoid effects to the potential habitat for *Botrychium* species.

3.8.2.3 No Action Alternative

There would be no impacts to plants, fungi, or lichens under the No Action Alternative, except from the potential spread of noxious weeds. The existing noxious weeds in the quarry area would not be removed. However, any use of the quarry by the FS, ODOT, or their contractors would require noxious weed mitigation prior to entering the quarry.

3.8.3 Mitigation Measures

Under Alternative 1, no measures are possible to mitigate the removal of vegetation in plant community E, which contains potential habitat for *Botrychium* species. Under Alternative 2 and the No Action Alternative, no impacts to plant communities are anticipated; therefore no mitigation measures would be required.

The following measures would be implemented to minimize the potential for the spread of noxious weeds.

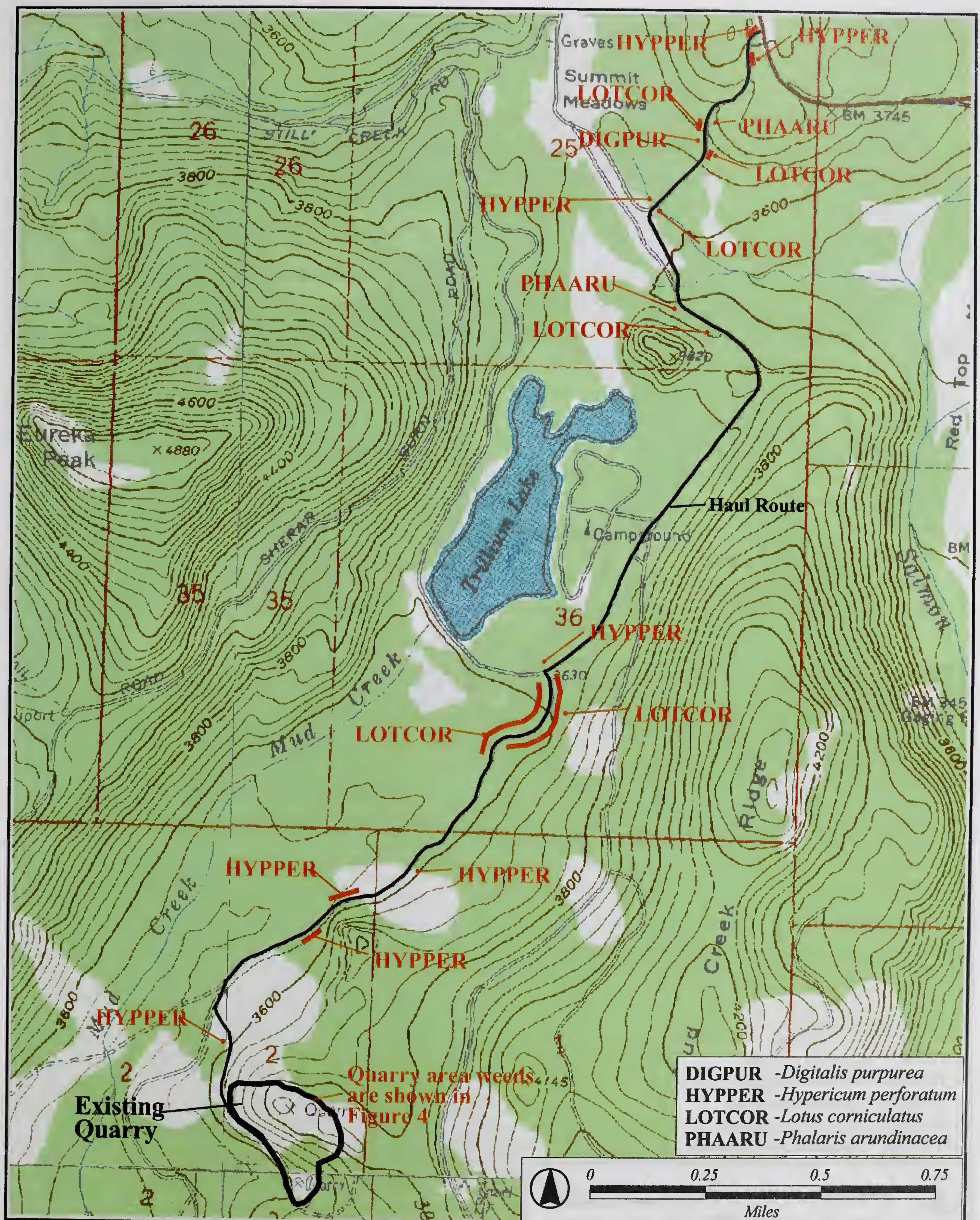
1. Prior to project implementation, all identified noxious weeds within the quarry should be removed. This includes pulling, bagging in plastic bags, and burying all noxious weeds including St. Johns wort and bull thistle. Scot's broom can be pulled or cut at the main stem at ground level. Scot's broom does not need bagging, only burying. If burying can be accomplished in the soil disposal area soon after bagging or cutting, all cut or bagged vegetation may be buried at the site.

2. A FS botanist would survey the quarry annually for noxious weeds and would draft a report as to the findings. (Alternatively, a qualified botanist would conduct a survey and prepare a report for review and approval by a FS botanist.) Additional weed control (bagging, cutting, burying) would be done annually if justified by the botanist's report.

3. Heavy equipment brought to the quarry from off the Forest should be free of soil clumps and vegetative matter or other debris that could contain seeds prior to entering the Forest.

4. Should material from outside the Mt. Hood National Forest boundaries be imported to the quarry, a FS botanist would be consulted prior to the material being transported to ensure noxious weeds are not imported to the quarry.

5. To protect from erosion, all exposed soil areas would be seeded, mulched, and fertilized by September 30 of each year where the area is disturbed. Grass species used would comply with the Mt. Hood National Forest policy on the use of native plants and be certified free of Oregon and All States noxious weeds. Mulch would be applied to the entire seeded area and to consist of straw from fields that grow State-Certified grass seed (which is certified free of



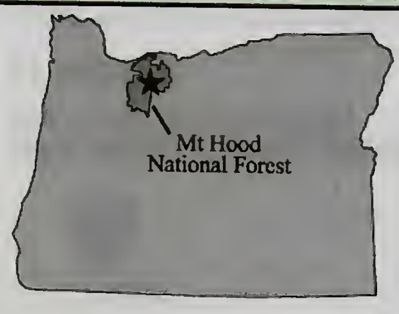


Figure 10

Noxious Weeds Along Tamarack Quarry Haul Route

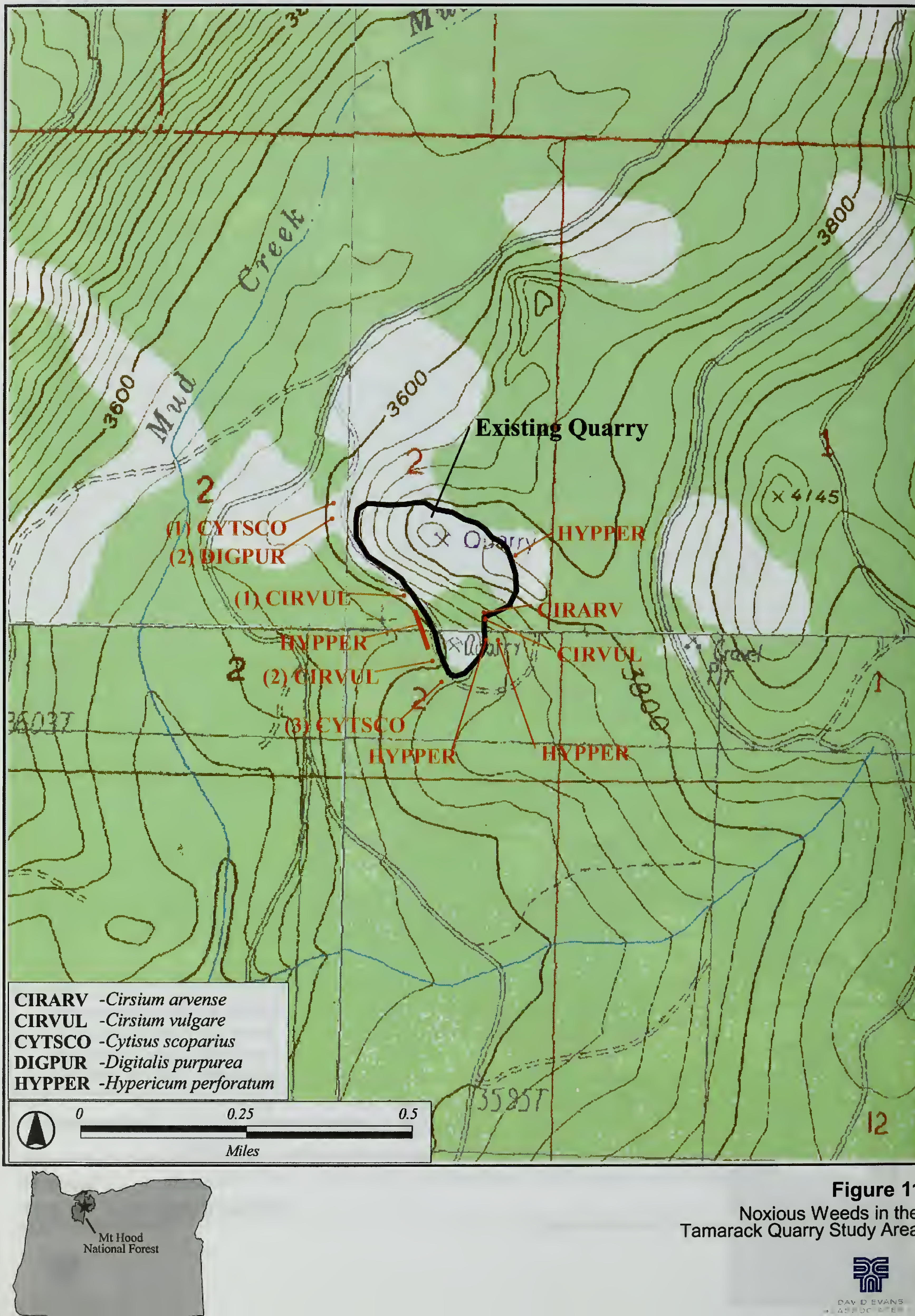


Figure 11
Noxious Weeds in the
Tamarack Quarry Study Area

DAVID EVANS AND ASSOCIATES

Oregon noxious weeds) or other sources determined to be free of noxious weeds. Mulch species preferably would be from native seed sources, annual rye, or cereal grain fields. Mulch should be applied at a rate of 3,000 pounds per acre.

3.9 SOILS AND GEOLOGY

3.9.1 Existing Conditions

The project area lies within the High Cascade Physiographic Province described by Franklin and Dyrness (1969). Locally, landforms where the project area is located, such as Mud Creek Ridge, the Mud Creek valley, and Summit Meadows, are typical of features associated with the High Cascade Province. Mud Creek Ridge is typified by rolling mountainous terrain of modest elevation (less than 5,000 feet). Its side slopes are moderately steep to steep, and primarily uniform (or in places concave) in shape. The valley of Mud Creek is U-shaped, and along with Summit Meadows is about one-quarter to one-half mile wide. Valley relief is primarily gentle and slopes are mild. The quarry site is located on the south side of an east-west oriented spur ridge that projects westward from the much larger north-south oriented Mud Creek Ridge. These ridges form the east valley wall of Mud Creek Valley. Both Mud Creek Ridge and the spur ridge are composed of andesite. This material originated as lava flows from ancient volcanoes that predate the present Mt. Hood volcano. The andesite material is approximately one to two million years old.

The haul route leads from the quarry down to the valley bottom, then past Summit Meadows and up to the base of Mt. Hood at US 26. Slopes around the quarry site naturally range between about 20 and 50 percent, while those directly at the quarry range from nearly level to very steep, in places being nearly vertical. In comparison, slopes crossed by the haul route usually do not exceed 30 percent.

The first recorded use of the quarry was in 1957, when 40,000 cubic yards were removed for a project on US 26. Excavation began on the south side of the spur ridge, probably because there were extensive rock outcrops and talus rock exposed there. Early excavations occurred at what is now the lower quarry level. Over the years the height of the quarry backslope increased until sometime in the 1970s when a bench or upper level was started. This reduced the height of the lower level backslope and allowed for safer quarry operations. Since then most of the rock excavation has occurred at the upper level.

Although the rock usage records for the Tamarack Quarry are incomplete, an estimate of the total volume of rock removed was made by estimating the original topography of the spur ridge and comparing that to the present topography. Using that method, the estimated volume of rock removed in 46 years of operation is approximately 450,000 cubic yards. Therefore, the long-term average annual volume of rock removed is about 10,000 cubic yards. Most of the rock removed from the quarry has been used by the FS or ODOT for road projects.

Standard rock quality tests have been conducted periodically since 1957, including surface samples and drill core samples. Rock quality test results indicate consistently good quality rock. A typical result for the LAR test is 18 to 24. Rock from Tamarack Quarry has been used satisfactorily for crushed aggregate, highway sand, riprap, and paving rock. Upland soils around the project area are dominated by moderately deep, gravelly sandy-loams and silt loams that have formed in colluvium of glacial till. The soils exhibit a moderate surface erosion potential, due primarily to slope.

Soil characteristics around the quarry site and along portions of the haul route are similar, but the quarry site itself is underlain directly by igneous rock, and, in places, soils are very shallow or wholly lacking (Howes, 1979). Drilling records indicate that samples collected from several old test borings at the site were andesite, and that there were no noteworthy groundwater-sources encountered (Deroo, pers. comm., 2003).

Several soil types are associated with valley bottom settings around the project area. Most tend to be either well drained or somewhat poorly drained. There are also wet meadow soils and poorly drained forested bottom lands that occur along the haul route, mainly between Trillium Lake and Summit Meadows. These soils have a high water detention potential and exhibit a low surface erosion potential. Wet soil types are considered sensitive to ground-disturbing activities (Howes, 1979).

The natural erosion regime associated with the Mud Creek catchment where the project is located is primarily related to periodic disturbance. It is probable that the highest rates of naturally occurring erosion were temporarily provoked when a disturbance such as intense wildfire caused bare soil to be exposed to erosive forces. Accelerated rates of surface erosion could have occurred for a time afterward until a protective cover of vegetation was reestablished. Most prone would have been upland soil types on moderately steep to steep slopes, which exhibit a moderate to high surface erosion potential when they are bare and devoid of cover. Under natural conditions, areas in the vicinity of the quarry site and haul route were not generally subjected to intense rates of surface erosion or large quantities of sediment production.

Human disturbance, however, has exposed surface soils to erosive forces in the project vicinity. The Salmon River Watershed Analysis (FS, 1995) indicates that this is attributed mostly to the presence of roads, and estimates that road-related sediment delivered to water bodies in the Mud Creek catchment could potentially amount to 160 tons annually. Of particular concern are road segments composed of dirt or gravel surfacing. In the Mud Creek catchment, the greatest potential for road-generated sediment to be delivered to a water body is where gravel and dirt roads cross over streams – for example, where FS road 2656-903 crosses Mud Creek, which is one-quarter mile west of the quarry site (FS, 1995). Because the haul route is paved with asphalt, sediment generated from the road is very slight when compared to that which is potentially produced from roads with dirt or gravel surfacing.

Road sanding during winter months can be another potential source of sediment delivery to streams. US 26 is the nearest road to the Mud Creek catchment that is sanded. However, because

there are no above-ground flow routes that directly connect the highway with water bodies in the Mud Creek catchment there is little potential for sanding materials to be delivered from the highway to any of the water bodies near to the haul route or quarry site. The haul route is closed in winter and is not sanded.

Areas in the catchment where timber harvest activities occurred in the past are considered to contribute less sediment than roads (FS, 1995). Currently there are no harvest operations occurring in the catchment, and all of the areas that have been previously logged are young plantations where a protective ground cover has established. Except for the remaining roads, any adverse impacts related to accelerated rates of erosion caused by timber harvest activities are diminishing.

At the quarry site, signs of accelerated surface erosion are evident. Unconsolidated sand and fine soil material is scattered loosely throughout the site, or has been arranged into piles and berms for storage. In places, some of the fine fraction materials have been mobilized and transported via concentrated runoff from water bars and hardened driving surfaces to a broad, shallow headwater swale on the south side of the quarry site. Some efforts have been undertaken in the past, with limited success, to control erosion at the quarry site. Currently, erosion control structures at the site are in relatively poor condition and marginally effective, presumably due to vandalism, off road vehicle use, the seasonal snowpack, and infrequent maintenance.

Sediment deposited to the swale from the quarry site does not appear to have undergone considerable transport farther downhill. The majority of spring runoff in the broad swale appears to be subsurface flow, as there are only several places where signs of water at the surface are apparent and there is no continuous channel extending downhill. Thus, the current potential for the sediment deposited in the swale to be transported to a perennial water body such as Mud Creek, one-quarter mile downhill, is very low. The sediment deposits, however, have been encroaching upon a seep located in the bottom of the broad swale about 250 feet from the south edge of the lower pit of the quarry site, a condition that could be judged as inconsistent with standard and guideline FW-084 in the Mt. Hood National Forest LRMP.

More detailed information about soils and erosion is presented in the Soil and Water Resources Technical Memorandum, in Appendix B of this document.

3.9.2 Pertinent Agency Directives

The Salmon River Watershed Analysis (FS, 1995) identifies land use allocations within the Mud Creek catchment designated by the LRMP (FS, 1990) and the Northwest Forest Plan (FS and BLM, 1994). Those that apply to the project area include B2 Scenic Viewshed and C1 Timber Emphasis. Standards and guidelines associated with these designations direct strategic and project-level planning, as well as land uses within their bounds. In addition to these directives, others to be considered in context of the activities and operations proposed in this FEIS include those listed as forest-wide standards and guidelines in the LRMP for soil.

Forest-wide standards and guidelines to be considered in relation to the proposed activities include those for minimizing or preventing undesirable impacts to soil that could result from the use of the transportation system (haul route) and the activities for expanding the quarry site. Those for consideration that most apply to the proposed activities include the following standards and guidelines (paraphrased):

- FW-025/026 Achieving effective ground cover
- FW-027 Removal and sale of topsoil
- FW-059 Implementation of individual best management practices
- FW-060 Preventing the degradation of water quality and natural drainage
- FW-066 Cumulative effects analysis
- FW-075/076 Protection from chemical and hazardous materials
- FW-416 Design standards for proposed road reconstruction
- FW-422/423/424 Minimizing impacts to soil and water resources
- FW-427 Minimizing disturbance to natural drainage patterns

3.9.3 Potential Impacts

A qualitative method was used to analyze the effects of the proposed alternatives. The haul route is not proposed to change beyond existing conditions, and in-depth and detailed analysis would probably not reveal distinct, measurable differences between the alternatives.

Standard practices and procedures for analyzing particular impacts to soil and water resources were considered as an approach for identifying simple cause-and-effect relationships between proposed activities and the natural conditions and physical characteristics of the project area. Cause-and-effect relationships were considered in the context of standard procedures defined in the US Environmental Protection Agency's (EPA) publication, *An Approach to Water Resources Evaluation of Non-Point Silvicultural Sources (A Procedural Handbook)* (EPA and FS, 1980). The primary items considered for concluding effects were the footprint areas of ground-disturbing activities. Secondary items included activities not considered ground-disturbing.

A reclamation plan has been developed for the Action Alternatives. Although excavation and reclamation would occur in stages, the following discussion describes impacts as if reclamation would not be done until rock removal has been completed for the entire project area, presenting a worst-case scenario.

More discussion of potential impacts is contained in Appendix B.

3.9.3.1 Effects Common to All Alternatives

The haul route and its footprint would be the same for all of the alternatives (Action and No Action). No ground-disturbing activities are proposed; hence, no additional impacts are predicted to occur to soil resources underlying the haul route as a direct or indirect consequence of its physical presence and location. Existing effects to soil resources are attributable to current uses and would not be expected to increase or decrease for any of the alternatives.

3.9.3.2 Effects Common to Action Alternatives 1 and 2

The haul route crosses a number of streams. However, because the haul route is paved throughout the area where there are stream crossings, sediment generated from the haul route would be light.

Under Alternatives 1 and 2, there would be an increase above the No Action Alternative in the amount of traffic using the haul route, attributable to periodic intensive hauling. Since the haul route crosses a number of small stream channels, there is greater potential for a portion of haul-related sediment to enter water. Despite these factors, the increase in the amount of related sediment that could be available to enter streams is expected to be slight.

Under both Alternatives 1 and 2, a reclamation plan has been developed and approved by the FS and would be implemented and updated throughout the course of operations and expansion. The excavation plans developed under the Action Alternatives would contain standard operating procedures to prevent accelerated erosion and contain sediment. Since activities proposed in the Action Alternatives are expected to occur more often than those which currently occur under the existing DOGAMI permit (No Action), it is expected that activities prescribed by excavation and reclamation plans would also occur more regularly.

3.9.3.3 Alternative 1

Implementation of Alternative 1 would remove more than two million cubic yards of rock material from the quarry area.

As a direct consequence of implementing Alternative 1, adverse impacts to soil resources could be expected over the greatest amount of area in relation to Alternative 2 and the No Action Alternative. The maximum limits of the quarry site proposed for Alternative 1 provide a footprint size of approximately 70 acres. Proposed expansion of the quarry site to that size could be expected to result in ground-disturbing activities occurring across 48 acres in addition to the existing 22-acre site.

As a result of expansion, the soil mantle and forest cover would be removed from most of the quarry area. Activities and use at the quarry, including the use of heavy equipment, machinery, and vehicles, would increase over existing conditions, causing further ground disturbance that could be expected to render driving surfaces across much of the site heavily compacted. Expansion and operations at the quarry site could result in three-fold increase in the amount of area exposed and heavily compacted.

The potential for sediment transport off site is very high with Alternative 1. Fully expanded, the 70-acre quarry site would mostly be bare and void of a vegetative cover. Exposed soil, sand, and fine aggregate materials at the site could be subject to erosive forces from wet season rains and spring snowmelt, and concentrated runoff could accumulate from large compacted and hardened surfaces. Of the alternatives under consideration, this alternative would expose the greatest area to erosive forces and would create the largest amount of hardened surfaces, thereby increasing the potential for accelerated surface erosion and sediment delivery offsite. However, sediment would not reach Mud Creek or other perennial streams. This alternative could result in the need for a substantially greater effort to minimize elevated rates of erosion and to contain levels of sediment to levels similar to the existing condition.

Removal of the soil mantle, in conjunction with an enlargement of compacted surfaces, would relate to a loss of inherent long-term site productivity over the 70-acre expanded quarry site, equal to a three-fold increase in the amount of affected area. Soil conditions would be severely diminished, making the site incapable of supporting forest vegetation for several decades. Conversion of the site to a non-productive status would add 48 acres to the amount of area currently in a non-productive condition (i.e., existing road segments) in the project vicinity and Mud Creek catchment.

The conditions described for this alternative could be expected to continue as long as the quarry site persists. Reclamation could eventually restore some of the area to a productive status, but the productive capacity could be expected to remain below natural levels across the 70-acre site over the long term.

Although the above discussion describes conditions as if reclamation would not occur until material has been removed from the entire expansion area, it is expected that reclamation would occur in stages, and that the entire 70-acre site would not be exposed at one time. This would partially mitigate impacts to soils.

3.9.3.4 Alternative 2

Under Alternative 2, it is estimated that up to two million cubic yards of rock material would be removed from the quarry.

As a direct consequence of implementing Alternative 2, adverse impacts to soil resources could be expected to be somewhat greater than the No Action Alternative, but less than Alternative 1. The maximum limits of the quarry site proposed for Alternative 2 would have a footprint size of approximately 50 acres. Proposed expansion of the quarry to that size would result in ground-disturbing activities occurring across 28 acres in addition to the existing 22-acre quarry.

As a result of expansion, the soil mantle and forest cover would be removed from most of the quarry area. Activities and use at the quarry, including the use of heavy equipment, machinery, and vehicles, would increase over existing conditions, causing further ground disturbance that could be expected to render driving surfaces across much of the site heavily compacted.

Expansion and operations at the quarry could result in an approximately two-fold increase in the amount of area exposed and compacted.

The potential for off-site sediment transport is high under Alternative 2. Fully expanded, the 50-acre quarry site would mostly be bare and without vegetative cover. Any exposed soil, sand, and fine aggregate materials at the site would be subjected to erosive forces from rains and snowmelt, and from concentrated runoff that could accumulate from large compacted and hardened surfaces. Proposed expansion in this alternative would notably increase the total area exposed to erosive forces and enlarge the amount of hardened surfaces appreciably, thereby increasing the potential for accelerated surface erosion and off-site sediment delivery, although sediment would not reach Mud Creek or other perennial streams. This could result in the need for a substantially greater effort to minimize rates of erosion and to contain sediment levels to those similar to the existing condition.

Removal of the soil mantle in conjunction with an enlargement of compacted surfaces would result in a loss of long-term productivity over the 50-acre expanded quarry site, equating to an approximately two-fold increase in the amount of affected area over existing conditions. Soil conditions would be severely diminished, making the site incapable of supporting forest vegetation for many decades. Conversion of the site to a non-productive status would add 28 acres to the amount of area currently in a non-productive condition in the project vicinity and Mud Creek catchment.

The conditions described for this alternative could be expected to continue as long as the quarry site persists. Reclamation could eventually restore some of the area into a productive status, but the productive capacity could be expected to remain below natural levels over the long term across the 50-acre quarry site.

Although the above discussion describes conditions as if reclamation would not occur until material has been removed from the entire expansion area, it is expected that reclamation would occur in stages, and that the entire 50-acre site would not be exposed at one time. This would partially mitigate impacts to soils.

3.9.3.5 No Action Alternative

As a direct consequence of implementing the No Action Alternative, adverse impacts to soil resources would be less than those for Alternatives 1 and 2. The maximum limits of the quarry site proposed for the No Action Alternative would have a footprint size of approximately 29 acres. Proposed expansion of the quarry site to that size could be expected to result in ground-disturbing activities occurring across 7 acres in addition to the existing 22-acre quarry.

As a result of quarry expansion, the soil mantle and forest cover would be removed from most of the quarry area. Activities and use at the quarry could increase somewhat, and would include the use of heavy equipment, machinery, and vehicles, causing some additional ground disturbance, which could render some of the driving surfaces across the expanded portions of the site heavily

compacted. Expansion and operations at the quarry site would increase the amount of area exposed and heavily compacted by approximately one-third.

Currently, the quarry site is exposed and poorly vegetated, and contains a large source of unprotected sediment. Its compacted surfaces are prone to concentrating runoff in the spring or during heavy precipitation events. As evidence, sediment deposits are readily observable in the broad swale immediately south of the project area and can easily be traced directly to the quarry site. Transport of sediment off site from the quarry appears to have been occurring for many seasons, primarily from snowmelt runoff. Expanding the quarry area by 7 acres would increase the amount of available runoff and sediment. The potential for off-site sediment transport would remain moderate to high under the No Action Alternative.

The absence of a soil mantle, in conjunction with the presence of compacted surfaces at the site, would relate to a loss of inherent long-term site productivity over an estimated 29 acres. Expansion of the quarry site could increase the amount of affected area by approximately one-third over the existing condition. Soil conditions at the quarry would remain severely diminished, making the site incapable of supporting forest vegetation for several decades. Conversion of the site to a non-productive status would add 7 acres to the amount of area currently in a non-productive status in the surrounding area.

The conditions described for the No Action Alternative could be expected to persist at the quarry site for the long term. Reclamation would not occur until extraction of rock materials is complete. Moreover, although reclamation would be aimed at minimizing surface erosion, it would not be expected to fully restore the site to a productive, vegetative status. The return of forest vegetation would take decades. Current practices to reduce elevated rates of erosion and contain levels of sediment under the No Action Alternative would continue to be minimal. Existing erosion control structures are only marginally functional. Despite their presence, it is evident that sediment generated from quarry surfaces has moved off site, particularly on the south side of the quarry.

3.9.4 Mitigation Measures

Under both of the Action Alternatives, a reclamation plan has been developed and approved by the FS and would be implemented and updated throughout the course of operations and expansion. At the minimum these would identify measures for annual erosion and runoff control, and sediment containment, including the following provisions.

1. Place and arrange stock piled soil, rock, or waste materials away from drainage and runoff pathways.

2. Prior to ceasing operations each year (i.e., before heavy snow closes the haul route), for the entire length of FS road 2656-955, as well as the first 0.1-mile segment of FS road 2656-903, and the intersecting segments of FS road 2656: install appropriately spaced structures to drain and dissipate concentrated runoff from road treads and ditch lines (e.g., culverts, waterbars, dry trenches below cross drain outlets, inboard drainage to ditch lines, check dams, etc.).

3. Place runoff control structures at the southern edge of the quarry site that are resistant to vandalism and off-road vehicle use (e.g., constructed benches, rock check dams and filters, rock containment berms, waterbars, infiltration drains, shallow evaporation basins, etc.).

4. Suspend operations, including haul, during excessively wet and high runoff events as determined by the Forest Service Road Manager.

5. Establish an effective ground cover over reclaimed and stock piled soils, including the use of seasonally rigorous species adapted to the site and capable of rebound from seasonal snowpack (e.g., prolific pioneer species enhanced by disturbance, such as long-stolon sedge and pearly everlasting).

Additionally, specific mitigation measures pertaining to stockpiled soil materials could greatly enhance reclamation efforts at the quarry site. During quarry expansion, removal of the soil mantle would entail scraping it nearly down to underlying rock, then stockpiling it on site for subsequent reclamation purposes. In the process surface and subsurface soil horizons would become mixed, altering several natural physical properties such as structure, porosity, and the distribution and arrangement of organic matter. Soil amendments could greatly enhance altered physical conditions by improving the nutrient status of stockpiled soils. Soil amendments used at the site should be approved by a FS botanist.

To reclaim and restore stockpiled soil materials to their inherent productive capability, measures beyond those typical of standard operating procedures could be necessary. These include not only seasonal applications of special soil amendments to enhance nutrient status and increase the content of organic matter, but also efforts to keep the bulk density of materials within a certain range after they are redistributed. Excessively compacted conditions should be avoided as should excessively loose conditions. In a moist state, soil materials should be somewhat firm, but not overly so.

3.10 HYDROLOGY

3.10.1 Existing Conditions

3.10.1.1 Watersheds and Streams

The project area lies mostly within the 4,394-acre 7th field hydrologic unit identified as the Mud Creek catchment. A much smaller portion of the project area is within the 6th field hydrologic unit identified as the West and East Forks of the Salmon River subwatershed. Both of these hydrologic units are contained within the upper portion of the 73,240-acre 5th field watershed of the Salmon River, a tributary to the Sandy River, which flows into the Columbia River (FS, 1995). The entire length of the Salmon River, from its headwaters to its confluence with the Sandy River, is designated a Wild and Scenic River. The Sandy River is designated Wild and Scenic from its headwaters to the Mt. Hood National Forest boundary.

Two perennial streams are near the project area and haul route: Mud Creek, the only named stream near the project site; and an unnamed stream originating from Summit Meadows. Both are headwater tributaries to the Salmon River. There are also a number of small, unnamed, seasonally flowing, intermittent streams that originate from the west slope of Mud Creek Ridge and are tributary to Mud Creek or Trillium Lake. Most cross beneath the haul route, and one is approximately 250 feet from the southern bounds of the quarry site.

Mud Creek is a small, perennially flowing, second-order stream that issues from Trillium Lake reservoir. Its mid- and upper reaches parallel portions of the haul route. Although both the lake and creek are nearby, they are not directly adjacent to or in contact with either the quarry site or the haul route. The shortest distance between the quarry site and Mud Creek is roughly 0.4 mile.

The unnamed perennial stream originates from Summit Meadows and crosses beneath the haul route near where it intersects with FS road 2656-131, about one-half mile south of US 26. It is associated with an adjacent wetland corridor that connects to a complex of wetlands downstream.

Between the Trillium Lake Campground and the quarry site are about ten very small, first-order ephemeral streams that cross beneath the haul route. In the spring and early summer they are freshets that are dry by mid- to late summer. One of these very small streams is proximate to the quarry site. It originates about 250 feet south of the lower pit of the quarry from a small, seasonally ponded seep in a broad shallow swale. The upper reaches are mostly subsurface flow, interspersed periodically with small, pools and wallows that dry up in the summer. These features are disconnected on the surface, and lack a continuous channel between them. About one-eighth mile downhill, this water source emerges to the surface as a continuous feature just above where it flows beneath FS road 2656. It then flows to Mud Creek in a shallow; 2- to 3-foot-wide, indistinct channel lined with dense forest vegetation and filled with an abundance of downed woody debris.

More information is available in Appendix B.

3.10.1.2 Streamflow and the Hydrologic Regime

The Salmon River Watershed Analysis indicates that average precipitation in the Mud Creek catchment ranges between about 65 and 70 inches annually (FS, 1995). The greatest amount falls in the period between November and January, and the least amount in July and August. During most years a winter snowpack accumulates in the drainage, providing water storage over the winter and supplementing surface flow and groundwater recharge in the spring and summer (FS, 1995).

The hydrologic regime of the upper Salmon River, including the 7th field Mud Creek catchment, is a snow- and rain-dominated system. Flows are usually lowest in the late summer and fall, then they typically increase in late fall and stay steady through the wet winter months until early spring. In spring, flows steadily rise again and peak during periods of high snowmelt, then they gradually diminish in late spring and early summer as the snowpack melts (FS, 1995). The project

area is within the upper range of the transient snow zone, where heavy intense rains can fall on accumulations of snow in the mountains. Such occurrences have resulted in the largest runoff and flood events recorded in the western Cascades (FS, 1995). Where rain-on-snow events periodically occur, both natural and human disturbances can have a considerable effect on peak flows, increasing the susceptibility of a watershed to flood events (Harr et al., 1975).

In western Oregon, natural disturbances capable of denuding the forest canopy over a large area, such as wildfire, have been shown to hasten the timing and accentuate the magnitude of peak flows, particularly those resulting from high precipitation and rain-on-snow events. A portion of the western half of the Mud Creek catchment was burned in the early 1940s, and the forest canopy was mostly destroyed over a large area (FS, 1995). The loss of the forest canopy would have diminished its moderating effects on interception of snow and rainfall, snow accumulation, snow melt, evapotranspiration, and runoff until a protective cover of vegetation returned. For a time, peak flows may have been elevated in Mud Creek as an indirect result of wildfire, leading to excessive stream bank erosion, channel scour, and downcutting. At present, however, effects to Mud Creek from past wildfire seem to have diminished greatly since the a protective forest canopy has returned to the once burned-over areas.

Human disturbance, such as road surfaces and clearcut timber harvest, can adversely affect the timing and magnitude of peak flows (Harr et al., 1975). As with natural disturbances, of particular concern are effects of human disturbance on peak flows generated by high precipitation and rain-on-snow events that can increase flooding potential. While past clearcut timber harvest and historic wildfire have been influences, their effect is thought to be diminishing as forest vegetation and a canopy continue to develop.

All of the streams near the quarry site and haul route can be considered relatively small in length, width, and average discharge. They have a low sediment transport capability, even during flood events. This is primarily attributable to the low gradient and gentle relief of the valley bottom, the attenuating effect of wetlands and Trillium Lake, groundwater storage, and porous upland soils. Therefore, fluvial erosion is not considered to be a primary, naturally occurring, sediment-producing and transport mechanism for the Mud Creek catchment.

3.10.1.3 Water Quality

The single beneficial use listed by DEQ for the Sandy River Basin that applies to water bodies that are in direct contact with the project area is categorized as resident fish and aquatic life. Beneficial uses applicable to other notable water bodies nearby, particularly Trillium Lake include boating, fishing, and water contact recreation (Oregon Administrative Rules, chapter 340-410). There are no streams or stream segments in the Mud Creek catchment and project area included on the DEQ 2002 303(d) list of water quality-impaired water bodies (DEQ, 2003) for the applicable beneficial uses.

While there are no known temperature concerns for streams flowing near the haul route or quarry site, the Salmon River Watershed Analysis (FS, 1995) identifies increased water temperature as a

potential concern for nearby Mud Creek, despite the high-quality sources of cold water from springs and wetlands in the area. Data obtained from continuous monitoring conducted in 2002 and 2003 detected temperatures downstream from Trillium Lake that for several periods during the summer exceeded 64° Fahrenheit, the standard for the 7-day average maximum water temperature established by DEQ for the Sandy River subbasin. The cause was attributed to the capability of the surface area of Trillium Lake to intercept solar radiation, along with stream side shade conditions at the time, and to discharge sun-warmed waters to Mud Creek.

The Salmon River Watershed Analysis (FS, 1995) also noted the potential for fine sediment to be delivered to streams from certain road segments in the Mud Creek catchment. Notable increases of fine sediment can have deleterious effects upon the quality and quantity of aquatic habitat. Low-gradient stream reaches such as those of Mud Creek below Trillium Lake were noted as being susceptible sites where fine sediment could potentially accumulate, causing undesirable effects to the quality of pool habitat. Of particular concern were contributing road segments with gravel or dirt surfaces near a water body. Segments of the haul route cross a number of streams, but since most of the haul route is surfaced with asphalt, the potential for large quantities of sediment to be delivered from its surfaces to streams is low. The potential for sediment to be delivered to a stream from the quarry site is also low, partly due to its distance from the nearest perennial stream, but also because there is no continuous channel nearby that connects surface flow directly with water bodies downstream.

3.10.1.4 Wetlands and Floodplains

Several wetlands in the valley bottom are near the haul route. Although the haul route is somewhat removed from, and not directly adjacent to most of these wetlands, it does cross through a wetland corridor that connects with them near the junction with FS road 2656-131, about one-half mile south of US 26. The haul route also crosses through a number of wet forest bottomlands between Trillium Lake Campground and the quarry site. There are no wetlands directly adjacent to the quarry site.

There are no jurisdictional, 100-year floodplains recognized by the Federal Emergency Management Agency or US Army Corps of Engineers in the project area.

3.10.1.5 Aquatic Conservation Strategy

A component of the Northwest Forest Plan, the Aquatic Conservation Strategy (ACS) was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. The ACS objectives are a fundamental part of the Northwest Forest Plan and apply to FS-administered lands within the range of the northern spotted owl. The purpose of the ACS is to restore and maintain the ecological health of watersheds and aquatic systems on public lands.

The March 2004 *Record of Decision Amending Resource Management Plans for Seven Bureau of Land Management Districts and Resource Management Plans for Nineteen National Forests within the Range of the Northern Spotted Owl* (March 2004 ROD) (FS and BLM, 2004b) clarified

the intent of the ACS. According to the March 2004 ROD, the ACS objectives are not intended to be applied or achieved at the site-specific (project) scale or in the short term. They are intended to be applied and achieved at the 5^{th}-field and larger watershed scales, and over a period of decades or longer. Based on the direction of the March 2004 ROD, an analysis of the ACS objectives for this project is not required.

3.10.2 Potential Impacts

Following is a discussion of potential impacts from the alternatives under consideration. See Appendix B for more detailed discussion.

3.10.2.1 Effects Common to All Alternatives

3.10.2.1.1 Hydrology, Streamflow, and Channels

Expansion of the quarry site for all alternatives can be considered a created opening. The removal of forest vegetation can effectively reduce interception and transpiration and increase snow accumulation, thereby increasing the amount of net precipitation available for runoff. These effects can alter the hydrograph and have been shown to hasten the timing and accentuate the magnitude of peak flows, particularly those resulting from high precipitation and rain-on-snow events (Harr et al., 1975).

Likewise, expansion as well as operations at the quarry site would create heavily compacted and hardened surfaces, where the capability for infiltration and water transmissivity into underlying materials is greatly diminished, which would also increase the amount of precipitation available for runoff.

As an indirect result, elevated peak flows resulting from created openings and hardened surfaces can lead to excessive stream bank erosion, channel scour, and downcutting. For small watersheds in the western Cascades within the transient snow zone, such as the Mud Creek catchment, effects of created openings begin to become pronounced when the amount of area consisting of a well developed, hydrologically mature forest canopy (represented here as forest stands older than about 15 to 30 years of age), is decreased by about 20 percent (Bosch and Hewlett, 1982; FS, 1990). The extent that hydrologic conditions are altered depends upon the amount of area in a hydrologically immature status.

The primary difference between the alternatives is the comparative size of the opening that would be created as a result of the quarry expansion, and the expanded size and extent of hardened surfaces. There are no proposed improvements, upgrades, reconstruction, or other actions associated with the haul route that would necessitate ground-disturbing activities; hence, no additional impacts to streams or channels are anticipated from the haul route.

Under each of the alternatives, the closest water body to the quarry site would be the small, seasonally wet seep located roughly 250 feet to the south in a broad swale.

3.10.2.1.2 Water Quality

Heavy equipment and machinery that would be used in quarry and haul activities require the use of a variety of petroleum-based fluids such as fuel, oil, and hydraulic fluid. These fluids would primarily be stored within the reservoirs and tanks of individual equipment and machinery, as well as in the tanks of service trucks. During operations, there would always be a possibility for accidents or breakdowns to potentially result in excessive leaks or spills.

Along the haul route, there would be some potential for a spill to enter a water body. If a spill were to occur, its potential to affect a water body would depend on its proximity and deliverable distance to it. The potential would be greatest during times when haul traffic is the highest. During most of the year, however, traffic would be low or non-existent, so the potential would be negligible. At the quarry site the potential for a spill to enter a water body and adversely effect water quality would be low, too, because the nearest source is a small seasonal seep about 250 feet to the south of the project area, and it has no continuous channel that connects to a tributary downstream.

3.10.2.1.3 Wetlands

None of the alternatives propose ground-disturbing activates within or near known wetlands. No direct impacts to wetlands are anticipated as a result of quarry expansion and operations. Wetlands in the catchment are located primarily in the valley bottom, and are far removed from the quarry site. There are no known pathways, such as roads or streams that directly link the quarry site to wetlands. Existing effects to wetlands are attributable to current uses, and would not be expected to increase or decrease for any of the alternatives.

Along the haul route, there would be some potential for a spill to enter a wetland. If a spill were to occur, the potential for it to affect a wetland would depend on its proximity and deliverable distance to it. The potential would be greatest during times when haul traffic is the highest. During most of the year, however, traffic would be low or non-existent, so the potential would be low.

3.10.2.2 Effects Common to Action Alternatives 1 and 2

3.10.2.2.1 Hydrology, Streamflow, and Channels

The size of the created opening that would result from expansion of the quarry site in Alternatives 1 and 2 would be 70 and 50 acres, respectively. Created openings of this size in a small forested watershed are considered rather large. In the western Cascades, openings of this size would tend to receive appreciably more rainfall because there would be very little loss due to interception by a forest canopy. An accumulation of a snowpack notably deeper than that of surrounding forested areas could be expected. In the spring, snow that had accumulated in the opening could melt earlier and faster than normal. Hardened surfaces at the site would limit the amount of precipitation and snowmelt that could infiltrate into the ground. Combined, these factors could cause a noticeable increase in available runoff from the quarry site.

If a substantial proportion of the available runoff were directed off-site toward the broad swale south of the project area, then a notable increase could occur in the amount of water that is normally contributed to its contributing area. As an indirect result, what would normally be subsurface interflow in the swale could become surface flow during periods of high antecedent soil moisture. Recurrence of such conditions over the span of numerous seasons might induce channel-forming processes. Small connected channel segments could begin to develop, altering the hydrology of the swale and its current capacity to store and retain moisture. Existing seeps and vernal pools would possibly disappear as a consequence, and the ability of the swale to store and retain sediment reversed.

Given the large opening that would result from quarry expansion, there is potential for intercepted precipitation at the quarry site to become stored groundwater available as localized contributions supporting base flow. Localized contributions at the catchment scale, however, would have little effect on base flows, including their magnitude and duration.

The duration of hydrologic effects at the site-specific scale attributable to the large quarry site in Alternatives 1 and 2 might last as long as the presence of the created opening and hardened surfaces persist. If left unmitigated, effects could persist for many decades until a hydrologically mature canopy becomes developed over most of the quarry site and the extent of hardened surfaces is sufficiently reduced.

3.10.2.2.2 Water Quality

Large, open, compacted surfaces located in the western Cascades would be capable of intercepting appreciable amounts of annual precipitation, potentially resulting in a noticeable increase in available runoff from the site. Runoff intercepted by hardened surfaces, such as roads, can be routed toward a water source. Roads, for example, can be links between sediment sources and streams, functioning as direct pathways for sediment to be delivered to water, potentially having an effect on water quality.

The quarry site in Alternatives 1 and 2 would be rather large (70 and 50 acres, respectively), and a considerable portion of its surface would be hardened and heavily compacted. Available runoff originating from its surface during rain events or spring snow melt could be intercepted by the access road (FS road 2656-955). Because the access road is not directly linked to any streams, sediment generated from the quarry site would not be routed to a stream. There is no known direct or indirect link via road surfaces between the quarry site and Mud Creek so there is little potential for quarry-generated sediment to adversely affect the water quality of Mud Creek.

Because Alternatives 1 and 2 could have more periods of intense haul using heavy trucks, there is a somewhat higher potential for these alternatives to generate sediment from traffic use beyond that generated by the No Action Alternative. However, the amount of generated sediment that might be delivered to streams and adversely affect water quality, is expected to be slight because intense haul would occur only intermittently during non-winter months throughout the course of the permit, and would not be expected to be prolonged over a long time frame.

3.10.2.2.3 Wetlands

Because Alternatives 1 and 2 could have more periods of intense haul using heavy trucks, there is a somewhat higher potential for the Action Alternatives to generate sediment from traffic use than would be generated by the No Action Alternative. However, the amount of generated sediment that could be delivered to a wetland would be slight because intense haul would occur only intermittently during non-winter months throughout the course of the permit, and would not be expected to be prolonged over a long time frame.

3.10.2.3 Alternative 1

3.10.2.3.1 Hydrology, Streamflow, and Channels

As a direct consequence of implementing Alternative 1, a non-forest patch of approximately 70 acres in size would be created due to quarry expansion, a 48-acre increase above the size of the existing quarry. The opening would comprise about 1.6 percent of Mud Creek's total catchment area. Additionally, ground-disturbing activities associated with quarry expansion and operations could be expected to expand the amount of heavily compacted surface area at the site by nearly three times its current size.

The maximum opening size expected as a result of quarry expansion under Alternative 1 would decrease the amount of area in a hydrologically mature condition in the Mud Creek catchment by about 1.1 percent. The potential effect of a created opening of this size upon the hydrograph is considered to be low at the catchment scale (7^{th} field hydrologic unit). Considering the slightly elevated peak flow estimates for the existing condition, and the moderately small percentage of the catchment converted to an opening in this alternative, the potential for notable alterations to the magnitude, timing, and duration of peak flows attributable to quarry expansion would be low and likely undetectable. Hence, the potential for undesirable channel effects such as excessive channel scour and bank erosion to Mud Creek, including its lower sensitive reaches, is expected to be low.

At the site-specific scale, hydrologic effects resulting from this alternative could be noticeable, as discussed above under Section 3.10.2.2, Effects Common to Alternatives 1 and 2.

3.10.2.4 Alternative 2

3.10.2.4.1 Hydrology, Streamflow, and Channels

As a direct consequence of implementing Alternative 2, a non-forest patch at least 50 acres in size would be created due to quarry expansion, a 28-acre increase above the size of the existing site. The opening would comprise about 1.1 percent of Mud Creek's total catchment area. Additionally, ground-disturbing activities associated with quarry expansion and operations could be expected to expand the amount of heavily compacted surface area at the site by approximately two times its current size.

The maximum opening size expected as a result of quarry expansion under Alternative 2 would decrease the amount of area in a hydrologically mature condition in the Mud Creek catchment by approximately 0.6 percent. The potential effect of a created opening of this size upon the hydrograph is considered to be low at the catchment scale. Considering the slightly elevated peak flow estimates for the existing condition, and the somewhat small percentage of the catchment converted to an opening in this alternative, the potential for notable alterations to the magnitude, timing, and duration of peak flows attributable to quarry expansion would be low and undetectable. Thus, the potential for undesirable channel effects such as excessive channel scour and bank erosion to Mud Creek, including its lower sensitive reaches is expected to be minimal.

At the site-specific scale, hydrologic effects resulting from this alternative could be noticeable, as discussed above under Section 3.10.2.2, Effects Common to Alternatives 1 and 2.

3.10.2.5 No Action Alternative

3.10.2.5.1 Hydrology, Streamflow, and Channels

As a direct consequence of the No Action Alternative, a non-forest patch at least 29 acres in size would be created due to quarry expansion, a 7-acre increase above the size of the existing site. The opening would comprise about 0.6 percent of Mud Creek's total catchment area. Additionally, ground-disturbing activities associated with quarry expansion and operations could be expected to expand the amount of heavily compacted surface area at the site by approximately one-third.

The maximum opening size expected as a result of quarry expansion under the No Action Alternative would decrease the amount of area in a hydrologically mature condition in the Mud Creek catchment by less than 0.2 percent. The potential effect of a created opening of such small size upon the hydrograph and peak flows is considered to be negligible at the catchment scale. Thus, undesirable effects such as excessive channel scour and bank erosion to Mud Creek, including its lower sensitive reaches would not be expected.

At the site-specific scale, the created opening at the quarry site would tend to accumulate a deeper-than-normal snowpack. In the spring, the snow covering the exposed opening could melt earlier and faster than areas under the shade of a forest canopy. Hardened surfaces at the site would limit the amount of snow melt that could infiltrate into the ground. Combined, these factors would cause an increase in available runoff from the quarry site. However, since there are no continuous surface flow-routes directly connecting the quarry site with a stream, noticeable effects to channels resulting from elevated runoff would not be expected. Instead, available runoff would infiltrate into the ground soon after leaving the quarry site.

The duration of hydrologic effects at the site-specific scale attributable to the quarry site could be expected to last as long as the presence of the created opening and hardened surfaces persists. Although overall hydrologic effects are considered slight compared to Alternatives 1 and 2, they would remain until a hydrologically mature canopy becomes developed over most of the quarry site, and the area of hardened surfaces sufficiently reduced. At the catchment scale, the effects

attributable to the quarry site, which are considered to be negligible, would diminish even further over time. As re-growth in clearcut areas continued to develop, the amount of hydrologically mature stands would increase in the catchment (assuming no future, widespread clear cut harvest).

3.10.2.5.2 Water Quality

The Salmon River Watershed Analysis (FS, 1995) indicated a distinct potential for fine sediment to be delivered to streams from certain road segments in the Mud Creek catchment. Contributing road segments of particular concern were those with gravel or dirt surfaces near to, or crossing, a water body. Because the haul route is surfaced with asphalt, its tread is not prone to generate sediment. Despite several short segments of the haul route where there are small bare-cut banks and ditch lines, the potential for plentiful quantities of sediment to be produced and delivered to a water body from its surfaces and adversely affect water quality is very low.

In general, traffic levels expected under the No Action Alternative would be relatively low, including times when material haul from the quarry site would occur. Under the No Action Alternative, the potential for sediment from the quarry site to be delivered to a stream and adversely impact water quality is also low, primarily because no water body is directly connected to the quarry site. The nearest water body is a small, seasonally wet seep about 250 feet south of the project area, and it does not have a continuous channel directly connected with tributaries, or ultimately to Mud Creek downstream.

3.10.3 Mitigation Measures

3.10.3.1 Hydrology, Streamflow, and Channels

Under both of the Action Alternatives, a reclamation plan has been developed and approved by the FS and would be implemented and updated throughout the course of operations and expansion. At the minimum these would identify measures for yearly runoff and sediment control, including the placement of runoff control structures at the quarry site that are resistant to vandalism and off road vehicle use (e.g., rock check dams, retention berms, drainage ditch lines, waterbars, infiltration drains, and shallow evaporation basins). Other mitigation measures would not be required.

3.10.3.2 Water Quality

For all alternatives, excavation and reclamation plans would be developed that would contain provisions for erosion control and sediment containment and would be intended to minimize the effects of project related erosion to water quality (for additional detail regarding prescribed erosion control, see listed items in Section 3.9.4, Mitigation Measures for soils and erosion).

The reclamation plan addresses spill response. A detailed spill response plan would be required for each individual development plan. These plans would include provisions for containment and treatment of fluids in the event of a spill. At the minimum they would require rock filter berms to be located around above-ground storage tanks to contain potential spills, impervious filter

materials beneath storage tanks to prevent petroleum based products from contaminating the site, and supplies of absorbent materials stored on-site or within close proximity to the haul route and quarry so that a certain level of immediate action can occur to prevent fluids from entering water bodies. Plans would primarily address petroleum-based fluids such as fuel, oil, and hydraulic fluid.

Additional mitigation measures would not be required.

3.10.3.3 Wetlands

As noted above, spill plans would be required as a condition of the special use permit and would prevent spills from entering water bodies. Other mitigation measures would not be required.

3.11 WILDERNESS

3.11.1 Existing Conditions

The project area is not within a designated or proposed wilderness area. The Salmon-Huckleberry Wilderness lies approximately 2.5 miles to the west, the Mt. Hood Wilderness lies approximately 5 miles to the north, and the Badger Creek Wilderness is approximately 8 miles to the east. The project area is not within or immediately adjacent to the area that was part of a proposal for a new wilderness area by Senator Wyden in 2004. There have been discussions about a potential proposal for a new wilderness area between members of the Oregon Delegation and the public, but at the present time there are no proposals in Congress. The Salmon-Huckleberry Wilderness is accessible from the Trillium Basin and project area via Sherar Burn Road (FS road 2613). The road leads to Veda Lake, which receives the majority of visitors, and also Kinzel Lake, Devils Peak, and the Dry Fir Trail, all on the north edge of the wilderness. The lake is a dispersed camping area. However, the road is rough, accessible with four-wheel drive vehicles only. Most users (approximately 4,000 per year) access the wilderness via the Salmon River Trail, from FS road 2618 from the north (which accesses the Green Canyon campground). People accessing the wilderness on Kinzel Trail, Dry Fir Trail, and Fir Tree Trail are estimated to be fewer than 100 per year, or approximately 2 percent of the total use (Walker, pers. comm., 2003).

Tamarack Quarry is visible from Sherar Burn Road, on the east side of the Salmon-Huckleberry Wilderness. Because the Sherar Burn (an area burned by wildfire approximately 70 years ago) constitutes the east portion of the wilderness, there are no mature trees to screen the view of the quarry and therefore can impact the users' wilderness experience.

3.11.2 Potential Impacts

3.11.2.1 Alternative 1

Alternative 1 would not directly affect the Salmon-Huckleberry Wilderness or its resources. Since the existing quarry is visible from Sherar Burn Road, the proposed expansion would create more of a visual impact to users' expected wilderness experience on the way to the actual wilderness area. However, only approximately two percent of visitors to the Salmon-Huckleberry Wilderness

use Sherar Burn Road. Therefore the impact is considered to be minor. See also Section 3.3 for a discussion of scenic resources.

There are potential traffic conflicts with recreation users who access the Salmon-Huckleberry Wilderness via FS road 2656 and 2613, although they are expected to be minor, as there are several other accesses to that wilderness area. See also Sections 3.4 and 3.5 for a discussion of traffic conflicts.

3.11.2.2 Alternative 2

The impacts of Alternative 2 would be similar to Alternative 1. However, the visual impact of the quarry expansion would be less than Alternative 1, as the quarry would be expanded by 20 fewer acres. See Section 3.3 for a discussion of scenic resources.

3.11.2.3 No Action Alternative

The No Action Alternative would have no direct or indirect impacts to any designated or proposed wilderness areas. Quarry expansion of seven acres would have some visual impact, as described in Section 3.3.

3.11.3 Mitigation Measures

As no direct impacts to any designated wilderness areas are anticipated, and the potential visual and traffic conflict impacts to Salmon-Huckleberry Wilderness users are considered to be minor, no mitigation measures are proposed.

3.12 CULTURAL AND HISTORICAL RESOURCES

Archaeological Investigations Northwest, Inc. (AINW) was retained to review previous surveys of the area and documentary records and reports on the history of the Trillium Lake area, as well as to conduct archaeological surveys. The results of the research are presented in a report, "Archaeological Survey of the Proposed Tamarack Quarry Expansion Project" (AINW, 2004), which is on file at the Mt. Hood National Forest headquarters.

3.12.1 Existing Conditions

3.12.1.1 Cultural History

Historically, the Salmon River Watershed has been used by American Indians as a major huckleberry picking area, particularly in the Sherar Burn, Mud Creek, and High Rock areas (FS, 1995). The area was also used seasonally for fishing and hunting. In the mid-to late 1800s, EuroAmericans crossed the watershed on the Barlow Road and Oak Grove wagon roads on their way to the Willamette Valley.

3.12.1.2 Methodology

AINW conducted a cultural resources literature search and pedestrian archaeological survey of the proposed project area. Records from the State Historic Preservation Office (SHPO) were checked to determine if archaeological sites had been recorded or if archaeological surveys had been conducted within the vicinity of the proposed project area. General Land Office (GLO) maps were reviewed to determine if historic-period structures or features were present within the proposed project area. In 1812, Congress created the GLO to survey the US, as mandated by the Land Ordinance of 1785. The 30 Public Lands states, including Oregon, were surveyed using the new rectangular system (partitioned into Township and Range). GLO maps recorded physical features and land claims and serve as historic records. Historical maps and published secondary sources, on file with AINW, were also reviewed.

The National Register of Historic Places (NRHP) is the nation's official list of cultural resources worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archaeological resources. The National Register is administered by the US Department of the Interior, National Park Service. Eligible properties include both properties formally determined as such by the Secretary of the Interior and all other properties that meet NRHP listing criteria (36 CFR 60.4). A review of the NRHP was conducted to determine if any historic properties are listed for the proposed project area. The results of the NRHP review indicated that there is one historic property, the Barlow Road, listed in the NRHP for the project area vicinity. The segment of the Barlow Road is located approximately two miles northeast of the proposed quarry expansion area.

Fieldwork was conducted on two separate occasions for the proposed quarry expansion project. On June 9, 2003, AINW conducted a pedestrian archaeological survey of approximately 48 acres of the proposed quarry expansion area, not including the 22 acres of the existing quarry. The area was surveyed in 50-foot intervals by walking east-west oriented transects. The southern portion of the project area was surveyed within the proposed expansion area boundaries. In the northern portion, the survey was of a rectangular area, some of which was outside of the proposed expansion area boundaries, to ensure that the entire expansion area was covered. On September 25, 2003, AINW surveyed an additional 20 acres, including 18 acres along the northern and eastern boundaries of the proposed quarry expansion area and approximately 2 acres at the west edge of the existing quarry along FS road 2656-955. The additional area was surveyed in 50-foot intervals by walking east-west and north-south oriented transects.

3.12.1.3 Archaeological Surveys

Several archaeological surveys have been conducted and several archaeological sites have been recorded in the vicinity of the current project area. Eight previous archaeological surveys overlap portions of the project area and haul route (FS road 2656 and FS road 2656-955), and three of the surveys resulted in the discovery of prehistoric or historic-period archaeological resources. Seven of the eight surveys were conducted by the FS for timber sale projects, and one of the surveys was conducted for wildlife habitat improvement (Bibb, 1988; Evans, 1982a, 1982b; Jaqua, 1995,

1997; Marvin, 1986; Thurlkill, no date.; Wildt, 1993). The three surveys that resulted in the discovery of archaeological resources were all timber sales. These projects are summarized below.

An archaeological survey of the Snowshoe Timber Sale near the flanks of Mt. Hood recorded one prehistoric site and three historic-period resources. A total of 664 acres was surveyed. The historic-period resources included a segment of the Pacific Crest Trail that begins at Barlow Pass and heads north towards Timberline Lodge, and two circa 1920s FS metal sheep grazing boundary signs nailed to trees (Bibb, 1988). The prehistoric site (35CL101) is a grove of peeled cedar trees located approximately 3.6 miles northeast of the proposed quarry expansion area.

The Lodge Pole Sale cultural resources survey consisted of the survey of a 6.5-acre area located along FS road 2656, approximately 0.25 mile northeast of the Trillium Lake campground (Evans, 1982a). This survey area is located approximately 1.7 miles northeast of the quarry expansion area. The survey resulted in the discovery of a segment of the Oak Grove and Oregon City Wagon Road (FS site number 669EA36), located approximately 1.5 miles northeast of the proposed quarry expansion area.

A survey of approximately 92 acres within the Pepper Timber Sale discovered two prehistoric archaeological sites (Haynes, 1988). Site 35CL251 is described as a lithic scatter (Jaqua, 1997). The other prehistoric site, listed only as FS number 669073, is described as a rock feature composed of basalt boulders and an associated small depression (Martin, 1997). The rock feature is the closest resource to the current quarry expansion area and is approximately one mile to the east.

Archaeological site OR-CL-20, the Summit Meadows Camp site, is along FS road 2656, 2.2 miles northeast of the proposed quarry expansion area. The Summit Meadows Camp site has served many functions over the years, with the earliest being an American Indian campsite used during trips to gather roots and huckleberries (Jaqua, 1999). The site may also have been used by emigrants traveling on the Barlow Road. This location also served as the Summit Ranger Station, a Civilian Conservation Corps camp, and as a Works Progress Administration camp used by construction crews building Timberline Lodge. The historic Summit Airstrip (FS site number 669-104), which dates to at least 1929, serves as the southwest boundary of the site (Jaqua, 1999).

3.12.1.4 GLO Map

The 1884 GLO map for Township 3 South, Range 8.5 East, shows no Donation Land Claims (DLCs) listed for the area containing the current FS road 2656 and no structures are indicated on the map. The area is labeled as "Oregon National Forest" and two historic-period wagon roads labeled "Mt. Hood and Barlow Wagon Road" and "Oak Grove and Oregon City Wagon Road" extend through Section 25, approximately two miles northeast of the proposed quarry expansion area. Section 36 contains an unnamed trail. Still Creek is also shown on the map. The 1923 GLO map for Township 4 South, Range 8½ East, has no DLCs indicated, but an unnamed trail extends through Sections 1 and 2. The portion of the trail extending through Section 2 is situated in the

approximate location of the current FS road 2656 and appears to follow the current alignment of the road, which is about 500 feet from the western edge of the proposed quarry expansion area.

3.12.1.5 NRHP Resource

The Mt. Hood and Barlow Wagon Road is named for Samuel K. Barlow, the pioneer who established the road through the Cascades to the Willamette Valley in 1845. A section of the Barlow Road crosses FS road 2656 approximately 200 feet east of site OR-CL-20, which is believed to have been used as a camping spot by people traveling the road. The NRHP nomination form for the Barlow Road indicates that the road possesses excellent integrity in this location and that the trace of the road is visible on a roadside cut of the FS road 2656 running south to Trillium Lake (AINW, 2004).

The Oak Grove and Oregon City Wagon Road was established to provide people from the Juniper Flat-Wapinitia area a more direct route to Oregon City. Before this road was opened, travelers had to use the Barlow Road, which required crossing the White River twice and paying Barlow's toll (Musser, no date). Peter Delore is credited with blazing the new route in circa 1869. The route met the Barlow Road at Summit Meadows, south of Government Camp. It is not clear who actually constructed the road, but Grauer (1975:22) stated that a French Canadian built the road to compete with the Barlow Road. A portion of the road is located along FS road 2656 northeast of Trillium Lake (Evans, 1982a), approximately 1.5 miles northeast of the current quarry expansion area.

3.12.1.6 Field Survey

Most of the project area is characterized by steep, heavily vegetated terrain. The northern and eastern portions of the project area are covered with coniferous trees with a thick understory of rhododendron, Oregon grape, and bear grass in some locations. There were some relatively flat areas along the eastern boundary, which also contains remnant mature cedar trees. The cedar trees were examined for evidence of peels, but none were discovered.

The northern portion of the proposed quarry expansion area was the most heavily vegetated and was the most difficult to survey because of the thick rhododendron. Vegetation was not as thick in the southeastern portion of the project area, and the southeastern and northwestern portions of the proposed quarry expansion area appeared to have been logged several years ago. A two-track road leading to the top of the existing quarry is in the southeastern portion of the proposed expansion area. Most of the southeastern portion of the proposed quarry expansion area consisted of steep rocky terrain adjacent to the existing gravel quarry.

Because most of the project area was covered in thick vegetation and forest duff, ground surface visibility varied from approximately zero to five percent, with the only mineral soil visibility coming from areas where vegetation was sparse and in exposed root wads resulting from tree throws. The numerous rock outcrops within the survey area were inspected for evidence of stacked rock features and other cultural material. No prehistoric or historic-period features or

artifacts were found during the pedestrian survey and there was no evidence of potentially important archaeological sites within the proposed quarry expansion area.

3.12.2 Potential Impacts

3.12.2.1 Alternative 1

No evidence of archaeological resources (sites or artifacts) was noted during the two pedestrian surveys of the proposed Tamarack Quarry expansion area. Based on the negative results of the field investigations, it is AINW's professional opinion that the proposed project would have no effect on any prehistoric or historic-period sites or resources. AINW therefore recommends a finding of "no historic properties affected" for the proposed quarry expansion project. As noted above, FS road 2656 was not surveyed because no road improvements are planned at this time. Should improvements to the road become necessary, the road would need to be surveyed to assess possible impacts from construction on cultural resources situated in or near the proposed access road. These resources include site OR-CL-20, and segments of the Oak Grove and Oregon City Wagon Road (FS site number 669EA36) and the Barlow Road. All of these resources are adjacent to or cross FS road 2656.

3.12.2.2 Alternative 2

Based on the negative results of the field investigations, Alternative 2 would have no impact on any archaeological resources.

3.12.2.3 No Action Alternative

Based on the negative results of the field investigations, the No Action Alternative would have no impact on any archaeological resources.

3.12.3 Mitigation Measures

1. Should unanticipated archaeological or historical resources be encountered during expansion of the quarry, all ground-disturbing activity in the vicinity of the find would be halted and the SHPO and FS would be promptly notified to assure compliance with relevant state and federal laws and regulations.

3.13 LAND USE AND PLANNING

3.13.1 Existing Conditions

3.13.1.1 Land Uses

The first recorded entry at Tamarack Quarry was in 1957, when 40,000 cubic yards of rock were removed for use on a US 26 project. The estimated total volume removed from the quarry is 450,000 cubic yards in 46 years of operation. The existing quarry comprises approximately 22 acres. The remainder of the project area is undeveloped forest land.

Trillium Lake Campground is north of the Tamarack Quarry. The main access to the campground is via FS road 2656. Section 3.5 provides more information about the campground and usage.

One hundred and sixty acres of private land lie east of Trillium Lake (T3S, R8½E, Section 35, tax lot 200) and are accessed via Sherar Burn Road (FS road 2613). The road runs through the property. The area south of the road was logged approximately 10 years ago. No residences are on the property.

Other private properties are north of the lake and comprise approximately 60 acres. They can be accessed via FS road 2656 and 2650. One 2.3-acre lot is separate from the others and does not contain a residence. The rest is a group of parcels south of Still Creek Campground—the Summit Meadows subdivision. According to Clackamas County tax assessor records, the subdivision contains 75 tax lots under 34 separate ownerships and 20 residences. At least one of the residences is occupied year-round (Norman, pers. comm., 2003a). The subdivision is approximately 2.5 miles northwest of the quarry.

3.13.1.2 Plans, Policies, and Regulations

3.13.1.2.1 Mt. Hood National Forest LRMP

The project area is within the Mt. Hood National Forest. The Forest wide standards and guidelines of the LRMP (FS, 1990) apply to land in the project area and vicinity. The project area land management allocation designations for the quarry and proposed expansion area are "B2, Scenic Viewshed" and "C1, Timber Emphasis." Forest-wide standards and guidelines that apply to the project area include those related to soil productivity; air quality; water quality; riparian areas; fisheries; forest diversity; threatened, endangered, and sensitive plants and animals; wildlife; forest protection and public safety; timber management; transportation systems/facilities; travel and access; dispersed recreation; visual resource management; cultural resource management; human rights; special uses; minerals management; and special forest products. The management prescription for the Scenic Viewshed management area that applies to the proposed project is B2-047 (H.3.): "All mineral developments shall require a complete development and rehabilitation plan, including restoration and landscaping prior to development." The management prescription for the Timber Emphasis management area that applies to the proposed project is C1-037 (I.): "Minerals exploration and development (i.e. locatable, leasable, and common variety) may occur."

The Tamarack quarry is categorized as "saleable (common variety) minerals." The Forest-wide standards for Minerals Management that pertain to the proposed project are FW-398 to FW-406. Section 3.13.2, Potential Impacts, contains the text of those standards as well as statements about proposed project compliance.

3.13.1.2.2 Northwest Forest Plan

In 1993, President Clinton directed an interagency task force (FEMAT) to identify management alternatives to resolve ongoing disputes about the management of federal forest lands in the range

of the northern spotted owl that would comply with existing laws, take an ecosystem approach to managing for biological diversity, and produce the highest contribution to economic and social well-being. The plan applies to over 24 million acres of public land managed by the FS and BLM, in the Pacific Northwest and northern California, including Mt. Hood National Forest land. The Northwest Forest Plan (FS and BLM, 1994) applies to the project area. The project area is located in the land management designation "Matrix" and is subject to the standards and guidelines of the Northwest Forest Plan. There are no specific standards and guidelines for non-harvest units. The Matrix consists of lands suitable for timber harvest and silvicultural activities, nonforested areas, and forested areas technically unsuitable for timber production. Approximately 4 million acres, or 16 percent of the Northwest Forest Plan land, is in Matrix.

3.13.1.2.3 Statewide Planning Goals

Although the FS, as a federal government agency, is not subject to state land use regulations, it does strive to comply with the intent of such regulations and policies. The foundation of Oregon's program for land use planning is a set of 19 statewide planning goals. The goals express the state's policies on land use and on related topics. Oregon's statewide goals are achieved through local comprehensive planning. State law requires each city and county to adopt a comprehensive plan and the zoning and land-division ordinances needed to put the plan into effect. The local comprehensive plans must be consistent with the statewide planning goals. Plans are reviewed for such consistency by the state's Land Conservation and Development Commission (LCDC) ("acknowledged"). Once acknowledged, a comprehensive plan becomes the controlling document for land use in the area covered by that plan. Most of the statewide goals are accompanied by "guidelines," which are suggestions about how a goal may be applied and are not mandatory. The two statewide goals applicable to the proposed project and project area are Goal 4: Forest Lands and Goal 5: Natural Resources, Scenic and Historic Areas, and Open Spaces.

Goal 4 is "to conserve forest lands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with sound management of soil, air, water, and fish and wildlife resources and to provide for recreational opportunities and agriculture" (Oregon Department of Land Conservation and Development, 2000). One of the four allowed uses on forest lands are locationally dependent uses. As the quarry is a locationally dependent use, its operation complies with Goal 4.

Goal 5 requires that local governments adopt programs to protect natural resources and conserve scenic, historic, and open space areas. Mineral and aggregate resources are a resource category that local governments inventory. Planning guideline 6 states that "in conjunction with the inventory of mineral and aggregate resources, sites for removal and processing of such resources should be identified and protected." Implementation guideline 9 states that "areas identified as having non-renewable mineral and aggregate resources should be planned for interim, transitional, and 'second use' utilization as well as for the primary use." Tamarack Quarry is not included in the Clackamas County inventory, most likely because it was not active (material being removed by truck) at the time of the original inventory (Glasgow, pers. comm., 2003).

3.13.1.2.4 Clackamas County

The FS, as a federal government agency, is not subject to procedural requirements associated with obtaining land use permits. The FS would, however, strive to meet or exceed the local comprehensive plan and development ordinance standards and policies. The Clackamas County Comprehensive Plan Mineral and Aggregate Resources goal is to "protect and ensure the appropriate use of mineral and aggregate resources while minimizing effects of mining and processing on surrounding land uses." The Comprehensive Plan inventories mineral and aggregate resource sites, but does not include Tamarack Quarry, as noted above (Clackamas County, 2003a).

The project area is in the Timber District (TBR) designated by Clackamas County (Glasgow, pers. comm., 2003). The proposed project would be considered a conditional use, as defined in Section 406.06 (Fritz, pers. comm., 2003). "B.6. Mining and processing of oil, gas, or other subsurface resources, as defined in ORS Chapter 520 and mining and processing of aggregate and mineral resources as defined in ORS Chapter 517" (Clackamas County, 2003b). The County does have a Mineral and Aggregate Overlay District, which it does not apply to federal land (Fritz, pers. comm., 2003).

3.13.2 Potential Impacts

3.13.2.1 Alternative 1

3.13.2.1.1 Land Uses

Alternative 1 would convert forest land to quarry use. However, the conversion of 41 acres of forest land from the Mt. Hood National Forest would be negligible. It would not have a direct impact on private property or the Trillium Lake recreation area. Potential recreation, traffic, and noise conflicts are discussed in the relevant sections.

3.13.2.1.2 Mt. Hood National Forest LRMP

In compliance with the LRMP management prescription B2-047 (H.3.) for the Scenic Viewshed management area, ODOT would submit a development and rehabilitation plan, and the FS would review and approve the plan prior to ODOT undertaking any operations in the quarry. Alternative 1 would comply with the C1 Timber Emphasis management allocation, as it explicitly allows minerals exploration and development. Alternative 1 would comply with the applicable forest-wide standards for Minerals Management, as follows:

a. *Removal of common variety mineral materials (e.g. sand and gravel) shall be administered on a sale or permit basis in areas where development does not conflict with other resource objectives. Mineral material requests shall be processed in accordance with procedures in 36 CFR 228, subpart C. Proposed mineral material sources shall have a Development Plan, before first entry.* ***FW-398 FW-399 FW-400***

Alternative 1 would comply with this standard because under either Action Alternative, ODOT would prepare a development plan prior to expansion of the quarry.

b. *Use of currently developed common variety mineral material sources shall be given priority over undeveloped sources. Exceptions shall be made when existing sources are unable to economically supply the quality and quantity of material needed or when conflicts with other resource uses are found to be unacceptable.* ***FW-401 FW-402***

Alternative 1 would use and expand the existing Tamarack Quarry, instead of developing a new resource. Therefore Alternative 1 would comply with this standard.

c. *The effect of rock crushing activities on air quality shall be considered. See Forestwide Air Quality Standards and Guidelines.* ***FW-403***

See Section 3.14 for a discussion of air quality.

The Administration of Operations standards are as follows:

1. No significant surface disturbing, locatable or saleable minerals-associated activities shall take place until an Operating Plan has been approved. ***FW-404***

Tamarack Quarry is considered to contain saleable (common variety) minerals. Alternative 1 would comply with this standard because under either Action Alternative, ODOT would prepare an operating plan prior to disturbance. The FS would review, modify if necessary, and approve the operating plan.

2. The Forest shall cooperate with the Bureau of Land Management in analyzing and processing surface use plans of operations for leasable minerals proposals. ***FW-405***

Tamarack Quarry is considered to contain saleable (common variety), not leasable minerals. Therefore this standard does not apply to the proposed project.

3. A Forest Rock Resource Plan shall be maintained as guidance for managing common variety minerals. ***FW-406***

Tamarack Quarry is considered to contain saleable (common variety) minerals. Alternative 1 would comply with the "Mt. Hood National Forest Rock Resource Plan" (FS 1987). The Rock Resource Plan guides the management of rock resources in the forest and establishes required elements and assigns responsibilities for seven types of work activities: master planning, management analysis, development and rehabilitation, operation, stockpile site construction and rehabilitation, stockpile allocation and use, and mineral materials sale and free-use.

3.13.2.1.3 Northwest Forest Plan

Alternative 1 would comply with the Northwest Forest Plan, as rock quarrying activity is permitted on Matrix lands.

3.13.2.1.4 Statewide Planning Goals and Clackamas County

Alternative 1 would not conflict with applicable Oregon Statewide Planning Goals or applicable sections of the Clackamas County Comprehensive Plan and Zoning and Development Ordinance. The project would be consistent with the County criteria for conditional uses (Clackamas County, 2003b).

Alternative 1 would not have any secondary or induced impacts on the Mt. Hood National Forest, since expanded quarry operations would not generate more natural resource extraction activities elsewhere or development other than planned projects. The FS would continue to manage the forest according to the LRMP. Therefore, there would be no induced population, noise, or business growth in the forest.

3.13.2.2 Alternative 2

The impacts of Alternative 2 would be similar as for Alternative 1, however Alternative 2 would convert 21 acres of Matrix land.

3.13.2.3 No Action Alternative

There would be no additional conversion of forest land under the No Action Alternative, and no conflict with land use plans, policies, or regulations.

3.13.3 Mitigation Measures

Land use impacts would not result from any of the alternatives under consideration; therefore no mitigation measures are proposed.

3.14 AIR QUALITY

3.14.1 Existing Conditions

The LRMP forest-wide standards for Air Quality that apply to the proposed project are the following:

B. Management Activities shall comply with all applicable air quality laws and regulations, including the Clean Air Act (1977 and any updates or revisions) and its associated Oregon State Implementation Plan. FW-040

1. *Management Activities shall comply with the Oregon State Smoke Management Plan.*
2. *Federal, State and local regulations for facilities management shall be applied.*
3. *Appropriate State performance requirements on emitting facilities for permitted activities that could affect air quality, e.g. mineral, oil, gas or other developments, shall be incorporated.*

C. Planning

1. *Forest management activities that could permanently degrade air quality shall consider the cumulative effect of Forest and non-Forest activities through the application of the Clean Air Act (1977) and where applicable, the Prevention of Significant Deterioration regulations (contained in the Clean Air Act).*

2. *Major Federal actions shall consider air pollution impacts.*

D. Forest resources in non-Class I airsheds shall be protected from the effects of air pollution based on the guidelines for Class II airsheds (Clean Air Act 1977).

E. Air quality related values within Class I airsheds, e.g. portions of the Mt. Hood Wilderness and all of the Mt. Jefferson Wilderness on the Mt. Hood National Forest, shall be protected from the effects of air pollution.

The "National Strategic Plan for Air Resource Management" (FS, 1994) provides strategies to protect FS lands from air pollution, to manage FS emissions, and to protect visibility in Class I Wilderness Areas.

The Mt. Hood Wilderness is designated as a Class I Area under the Clean Air Act amendments of 1977. National wilderness areas, national parks, and national wildlife refuges in existence at the time the amendment was passed are classified as Class I. All other areas are designated as Class II. (The Salmon-Huckleberry Wilderness is not designated as Class I.)

The FS maintains an air quality station on Mt. Hood to monitor ozone and particulates (FS, 2003a). DEQ also maintains an air quality monitoring site at the top of the Mt. Hood Ski Bowl chairlift on Multorpor Mountain, three miles north of the quarry. The purpose of the two stations is to monitor visibility in the Mt. Hood Wilderness' Class I airshed.

The DEQ site's nephelometer takes air samples and measures their scattering coefficients, which is observed visibility. Measurements are recorded seasonally July 1 through September 15 between 9:00 a.m. and 9:00 p.m. DEQ has not adopted any air quality standards for visibility/light scattering. Impairment is categorized into "perceptible," "moderate," and "heavy." In general, visibility is good, with most impairment in the "perceptible" category. In the nine years of available data (1994 through 2002), the Mt. Hood Wilderness visibility typically has been better than at Crater Lake National Park and comparable to the central Cascades area—the two other visibility impairment monitoring sites in Oregon (DEQ, 2002).

DEQ requires an ACDP for activities that crush more than 5,000 tons per year of crushed rock.

3.14.2 Potential Impacts

3.14.2.1 Alternative 1

Dust from rock extraction, crushing, screening, batching, loading, and hauling would cause localized air quality impacts to the Trillium Lake Campground area. FS road 2656 is paved. It is highly unlikely that exhaust from equipment would cause a plume that would be visible from Timberline Lodge, as typically exhaust plumes do not appear unless there is a large concentration

(more than 20) of heavy vehicles that are idling simultaneously in one location (Moore, M., pers. comm., 2004). ODOT would have less than a half-dozen vehicles operating at any one time. The projected truck traffic volumes resulting from the proposed project would be negligible compared to volumes on US 26. The typical number of trips per day on the haul route is expected to be 53 per day, with a worst-case scenario of 285 per day. In comparison, US 26 ADT east of Government Camp is 7,000 vehicles.

Rock crushing would occur under Alternative 1. Slash piles may be burned as part of timber clearing in the project area. This would create a short-term air quality impact. Slash burning would comply with the Smoke Management Plan. The clearing of trees may lessen the potential for wildfire at the project site.

ODOT would comply with the LRMP Forest-wide standards and guidelines for air quality by obtaining a Simple ACDP from DEQ for rock crushing operations. The permit includes all the testing, monitoring, record keeping, and reporting requirements sufficient to determine compliance with the emissions limits and standards. The Simple ACDP is issued for a period of 5 years.

Title V of the 1990 http://www.epa.gov/air/oaq_caa.htmlFederal Clean Air Act requires each state to develop a comprehensive operating permit program for major industrial sources of air pollution. As defined in the Title V Operating Permit Program, a major source of air emissions has the potential to emit 100 tons of any criteria pollutant or 10 tons of any single hazardous air pollutant or 25 tons of any combination of hazardous air pollutants. The rock quarrying operations at Tamarack Quarry are expected to emit fewer than 100 tons of air pollutants, and would not emit any hazardous air pollutants.

DOGAMI does not regulate air quality. However, if there are complaints about air quality impacts from the implementation of Alternative 1, DOGAMI may require ODOT to implement mitigation measures. The only standard applied is that dust may not exceed a "reasonable" impact (Moore, R., pers. comm., 2003). The extraction, crushing, screening, batching, and loading of rock may create dust.

3.14.2.2 Alternative 2

The impacts of Alternative 2 would be the same as those of Alternative 1. Although the expansion area would be smaller and ODOT would remove only up to 2 million cubic yards of rock under Alternative 2, approximately the same number of vehicles and equipment would operate for the same length of time under both alternatives for each time ODOT would enter the quarry.

3.14.2.3 No Action Alternative

There would be no new air quality impacts under the No Action Alternative. The extraction, crushing, screening, batching, and loading of rock may create dust.

3.14.3 Mitigation Measures

1. If either Action Alternative creates dust that impacts air quality, ODOT would suppress dust by sprinkling with water or implementing other approved treatment. If water is used a legal source from a municipal water system would be obtained prior to project construction. No water would be taken from any streams on National Forest system lands or Trillium Lake.

3.15 NOISE

3.15.1 Existing Conditions

The Mt. Hood Forest Plan does not address noise. DOGAMI does not regulate noise resulting from quarry operations (Moore, R., pers. comm., 2003), and DEQ relies on local governments to enforce its noise regulations.

Mining or processing of rock is exempt from state noise regulations unless it is within one-half mile of a noise sensitive area and either operates at night or more than nine hours during the daytime and seven days per week (Oregon Revised Statutes 467.120). State administrative rules define noise sensitive areas, in part, as those "normally used for sleeping." Therefore the Trillium Lake recreation area and Summit Meadows subdivision are both considered noise sensitive areas. However, the closest part of Trillium Lake is more than 1.5 miles north of the quarry, and Summit Meadows is approximately two miles away. Both sites are farther away than the state one-half mile threshold.

Existing sources of noise in the Trillium Lake area include blasting, crushing, and hauling from current quarry operations and recreation-related noise such as auto traffic, generators, conversation, dogs barking, etc. Peak noise levels along the haul route are estimated to be 80 to 83 dBA, assuming the truck source is 50 feet away from the receptor (person recreating), and the truck is moving at 30 to 40 miles per hour.

3.15.2 Potential Impacts

3.15.2.1 Alternative 1

ODOT would use noise-generating equipment to extract and crush rock at Tamarack Quarry. Peak noise levels would be the same as the existing condition, however, the frequency and duration of noise would increase. The types of equipment in operation would be the same under Alternative 1 as under existing conditions. Truck hauling material would create the primary noise impact to a noise-sensitive area, i.e., Trillium Lake Campground. Peak noise levels from trucks on the haul route would be 80 to 83 dBA at 50 feet from the receptor and at a speed of 30 to 40 miles per hour. On a typical day, ODOT estimates that trucks would make 53 trips. Peak use (worst-case scenario) would be 285 truck trips per day. Blasting would occur only two to three times per year. As part of project design, noise-generating activities would occur only between 7:00 a.m. and 7:00 p.m. on non-holiday weekdays (until noon on Fridays). (See Table 2-1 for days and times when various activities would be permitted.) In addition, noise impacts would be

somewhat minimized by the topography of the Trillium Lake basin—there is a ridge between the quarry and the campground that would serve as a noise barrier.

Quarry operations would be exempt from state noise regulations since no operations would occur at night, and operations would occur only on weekdays. See Section 3.6 for a discussion of noise impacts to the northern spotted owl.

3.15.2.2 Alternative 2

The noise impacts would be similar to those of Alternative 1. The loudness, duration, and frequency of noise generated annually would be similar to Alternative 1, although quarry operations are expected to cease a few years earlier than under Alternative 1.

3.15.2.3 No Action Alternative

Since the type of rock extraction and crushing equipment used under the No Action Alternative would be the same as that used under Alternative 1 or Alternative 2, noise emitted would be similar in terms of loudness and duration. However, operations would probably occur less frequently than under the Action Alternatives.

3.15.3 Mitigation Measures

As part of the proposed project, noise-generating operations would be limited to weekdays, and equipment would be muffled as appropriate. No mitigation measures are proposed.

3.16 ECONOMICS

3.16.1 Existing Conditions

During the emergency repair of OR 35 after the October 2000 Newton Creek and White River flood event, the price for riprap from a local commercial source would have been $18.75 per ton delivered. A recent ODOT estimate to purchase crushed and delivered commercial sanding rock to the stockpile in Government Camp was $16.00 per cubic yard (Barnhart, pers. comm., 2003). Assuming ODOT would use an average of 100,000 cubic yards of material each year, the annual cost of using a private supplier would be approximately $1.6 million. It is estimated that the price to hire a contractor to crush and deliver sanding rock from Tamarack Quarry would be between $8 and $10 per cubic yard, or approximately $800,000 to $1 million assuming an average of 100,000 cubic yards, and assuming that ODOT would solely use Tamarack quarry for its supply of rock.

Currently, ODOT has only one private supplier that it would use as a source (Barnhart, pers. comm., 2003). Jim Turin & Sons Inc. owns and operates the Brightwood quarry on Barlow Trail Road in Zigzag. The rock at the quarry is basalt. It is the nearest commercial quarry to the Mt. Hood area and is approximately 20 miles from Tamarack Quarry. The business owners estimate that approximately less than 5 percent of their rock business is with ODOT, and approximately 20 percent of their asphalt business is with ODOT. The percentage of Jim Turin & Sons' business

with ODOT varies, depending on whether the company is supplying material for a particular project, or only for roadway maintenance (Turin, pers. comm., 2004).

The FS issues mineral permits to the general public to collect small quantities of rock from Tamarack Quarry. In fiscal year 2002, the FS sold 72 mineral permits for the site at $25 each (revenue of $1,800).

3.16.2 Potential Impacts

3.16.2.1 Alternative 1

ODOT's current private supplier in the area, Jim Turin & Sons Inc., could lose up to 20 percent of its current asphalt business and up to 5 percent of its current rock business under Alternative 1. ODOT may still use private suppliers such as Jim Turin & Sons Inc. for construction rock and asphalt, but Tamarack Quarry would be the primary supply of sanding rock. ODOT would save as much as $600,000 to $800,000 per year on roadway projects. ODOT would use Tamarack Quarry until the rock supply in the 70-acre expanded quarry is exhausted, estimated to be more than two million cubic yards, or what ODOT anticipates extracting in 20 years or more.

ODOT cannot sell any rock products produced from the quarry.

The general public would still be allowed to access the quarry and collect small quantities of rock. There would be no impact to the mineral permit sales.

3.16.2.2 Alternative 2

The impacts of Alternative 2 would be similar to those of Alternative 1, except that ODOT expects to extract no more than two million cubic yards of rock. Once the rock supply in the 50-acre quarry is exhausted, ODOT would need to find another material source.

3.16.2.3 No Action Alternative

Under the No Action Alternative, ODOT and the FS would continue to extract rock from the currently permitted area of the quarry. ODOT would continue to use private suppliers as its main source of rock materials. Jim Turin & Sons Inc. would not experience a decrease in its business with ODOT due to increased use of Tamarack Quarry. ODOT likely would spend as much as $600,000 to $800,000 more per year on rock material than under either Action Alternative.

3.16.3 Mitigation Measures

No mitigation measures are proposed.

3.17 ENVIRONMENTAL JUSTICE

Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations of February 11, 1994, requires agencies undertaking federal projects to identify low-income and minority populations, assess whether adverse human

health or environmental impacts would result from each of the alternatives, and address the project's public outreach program in relation to environmental justice issues.

The federal Council on Environmental Quality (CEQ) issued "Environmental Justice: Guidance Under the National Environmental Policy Act" to comply with EO 12898 and Title IV of the Civil Rights Act of 1964 (42 USC 2000d-1). CEQ Guidance states that agencies should determine the composition of minority populations, low-income populations, and American Indian tribes present in the area that may be affected by a proposed action.

3.17.1 Existing Conditions

3.17.1.1 Minorities

Areas of concern in assessing environmental justice impacts are those where either a minority population represents 50 percent or more of the total population or where the percentage of a minority population is meaningfully greater than its representation in the general population or other appropriate unit of geographic analysis. The census tract and block group are shown as the units of geographic analysis, in comparison with Clackamas County as a whole.

The Census Bureau categories reported are for individuals who identify themselves as Black or African American alone, American Indian and Alaska Native alone, Asian alone, Native Hawaiian and other Pacific Islander alone, some other race alone, two or more races, and of Hispanic origin. The number of people in each of the racial groups was combined to calculate the percentage of all minority races. Persons of Hispanic origin are not included in this total, as persons of Hispanic origin may be of any race. Table 3-4 indicates the percentage of minority residents in Clackamas County and project census tract and block group per the 2000 Decennial Census (US Census Bureau, 2000).

Table 3-4. Racial Composition by Area, 2000

Geographic Area	% Black or African American	% Am. Indian and Alaska Native	% Asian	%Native Hawaiian and Other Pacific Islander	% Other Race	% Two or More Races	% All Minority Races[1]	% Hispanic Origin of any race[2]
Clackamas County	0.7	0.7	2.5	0.2	2.3	2.5	8.7	5.0
Census Tract 243.01	0.3	1.5	0.6	0.1	2.2	2.1	6.7	5.6
Block Group 2	0.0	1.4	1.0	0.0	0.0	2.5	4.6	1.0

Source: US Census Bureau, Census 2000 Summary File (SF) 1 100-Percent Data. P7 Race; P11. Hispanic or Latino
[1] Sum of Black or African American alone; American Indian and Alaska Native alone; Asian alone; Native Hawaiian and Other Pacific Islander alone; some other race alone; and two or more races.
[2] Persons of Hispanic origin may be of any race.

The minority population in all of the categories, including all minority races combined, is not above 50 percent in the project block group, census tract, or the county. All categories of minority

populations in the census tract and block group are the same as or lower than the county as a whole except American Indian and Alaska Native and Hispanic origin. However, the percentage of people identifying themselves in these two categories in the census tract and block group is not appreciably different from the county as a whole.

The closest Indian reservation is the Warm Springs Indian Reservation, approximately 6.5 miles southeast of the project area. It belongs to a confederation of the Warm Springs, Wasco, and Paiute Tribes. The treaty of 1855 granted the Confederated Tribes of the Warm Springs the right of "usual and accustomed" gathering of traditional native plants and "special interest" use.

3.17.1.2 Poverty

In determining the poverty status of families and unrelated individuals, the Census Bureau used income earned in the previous 12 months (1999) and based income threshold on family size, presence and number of children, and age. The percentage of the population in the project block group, census tract, and Clackamas County with an income below the federal poverty level is shown in Table 3-5.

Table 3-5. Poverty Status in the Project Area, 1991[1]

Geographic Area	% Below Poverty Level[1]
Clackamas County	6.6%
Census Tract 9912.02	5.9%
Block Group 3	2.8%

Source: US Census Bureau, Census 2000, Summary File 3 (SF3) Sample Data. P87 Poverty Status in 1999 by Age.

[1] *Poverty status was determined for all persons except institutionalized persons, persons in group quarters and in college dormitories, and unrelated individuals under 15.*

The block group and census tract containing the project area have lower poverty rates than the county as a whole.

3.17.2 Potential Impacts

Impacts are considered significant if they are disproportionately high and adversely affect minority and low-income populations. A disproportionately high and adverse effect is one that is predominantly borne by a minority population and/or a low-income population, or would be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that would be suffered by the non-minority population and/or non-low-income population.

3.17.2.1 Alternative 1

Alternative 1 would not have a disproportionately adverse long-term effect on minority and low-income populations, as the project is not in an area with a proportionately large population of minority or low-income residents. No activities are proposed that would preclude any granted rights of the Confederated Tribes of the Warm Springs.

The project is not likely to generate any temporary or permanent new jobs. Therefore there would be no particular benefit for minorities or low income people in terms of employment. There are hazards and risks associated with working in a quarry with heavy equipment, and driving on narrow roads. These risks do not fall disproportionately on minorities or low income persons, and there are safety practices in place to provide appropriate levels of protection.

Agencies are required to consider whether human health effects, in terms of risks and rates, are significant or above accepted levels. Impacts such as noise and dust would be the same for minority and low income people as for the general population. No significant adverse human health effects have been related to operation. The project would not result in increased exposure of residents to hazardous materials.

3.17.2.2 Alternative 2

The impacts of Alternative 2 would be the same as for Alternative 1.

3.17.2.3 No Action Alternative

The No Action Alternative would have no impacts to minority or low income populations.

3.17.3 Mitigation Measures

The proposed project would result in no disproportionate significant adverse impacts to minority or low-income persons; therefore, no mitigation measures related to Environmental Justice are necessary.

3.17.4 Public Outreach

An important component of EO 12898 is assuring that all portions of the population have a meaningful opportunity to participate in the development of federal projects regardless of race, color, national origin, or income. CEQ guidance states that agencies should acknowledge and seek to overcome linguistic, institutional, geographic, and other barriers to meaningful participation, and should incorporate active outreach to affected groups.

Notice of the proposed action and DEIS were published in the Federal Register and in *Sprouts*. The project was presented at a public open house on December 5, 2002, at the Mt. Hood National Forest Headquarters in Sandy, Oregon, and at a second open house on May 13, 2004, at the Lions Club in Welches, Oregon. Section 1.8 describes public involvement and Section 1.9 lists the key issues raised. The DEIS is posted on the Mt. Hood National Forest website: http://www.fs.fed.us/r6/mthood.

3.18 HUMAN HEALTH AND SAFETY

3.18.1 Existing Conditions

The EPA, DEQ, and Oregon State Fire Marshal website databases were searched to locate any nearby hazardous waste sites. There are no Superfund sites (National Priorities List) within five miles of the project site. The closest sites are in The Dalles and the Hamilton Island Landfill on the Columbia River near Bonneville (EPA, 2003). DEQ records several sites within a five-mile radius of the project location. One is a spill clean-up at a Mobil Oil site where US 26 turns south. There is one contaminated site clean-up on US 26, and there are seven leaking underground storage tanks and four hazardous waste sites in Government Camp (DEQ, no date).

Facilities that possess reportable quantities[2] of hazardous substances[3] must report to the Office of State Fire Marshal. Information on Class A, B, and C explosives, blasting agents, insensitive explosives, poison gases, etiologic materials, and radioactive materials is not provided by individual facility for security reasons. There are 18 sites in the area, mostly in Government Camp (Oregon Office of State Fire Marshal, 2003). These include gas stations, towing

[2] 50 gallons of liquids (e.g., paint), 500 pounds of solids (e.g., fertilizer), 200 cubic feet of gases (e.g., propane); for poisons or explosives: 5 gallons of liquids, 10 pounds of solids, and 20 cubic feet of gases

[3] Any substance that is required to have a Material Safety Data Sheet, any substance or waste produced in a manufacturing process defined as hazardous by DEQ, poisons and explosives, any non-sealed source of radioactive material, any substance designated as hazardous by the Office of State Fire Marshal.

companies, telecommunications facilities, ski facilities, the sanitation facility, and the rural fire protection district. ODOT stores maintenance-related materials in a site along US 26.

There is no known contamination at Tamarack Quarry (Deroo, pers. comm., 2003).

3.18.2 Potential Impacts

3.18.2.1 Alternative 1

Since there are no known contaminants on the project site and no hazardous materials identified within five miles of the site, there would be no impacts under Alternative 1. If ODOT stores reportable quantities of hazardous substances, ODOT would notify the Office of State Fire Marshal, as required.

Heavy equipment and increased human activity at the site could increase the potential for fires starting at the perimeter of the quarry (e.g., from electrical sparks).

3.18.2.2 Alternative 2

The impacts would be the same for Alternative 2 as for Alternative 1.

3.18.2.3 No Action Alternative

There would be no impacts under the No Action Alternative.

3.18.3 Mitigation Measures

No mitigation measures for hazardous substances are proposed.

1. To minimize the potential for fire starting at the site, vegetation near quarry operations would be sprayed with water during the high fire season (e.g., late summer and early fall).

Tamarack Quarry Expansion Project

Final Environmental Impact Statement

Chapter 4
Cumulative Effects

Changes between Draft and Final EIS:

Minor corrections, clarifications, and edits were made.

4. CUMULATIVE EFFECTS

Long-term, cumulative effects are those that result from the incremental impact of the proposed federal action when added to other past, present, and reasonably foreseeable future federal, state, or private activities that would occur within the action area. An example of a cumulative effect of particular concern to the FS is soil erosion and stream sedimentation from multiple timber permits and private logging operations in the same watershed. The cumulative effects of an action may be undetectable when viewed in the individual context of direct and even secondary impacts, but can nonetheless add to other disturbances and eventually lead to a measurable environmental change.

For the proposed action, the land unit to consider for cumulative effects to soil and water resources is primarily the Mud Creek catchment, although the next higher level land unit, the Upper Salmon River subwatershed, is also considered. Future and foreseeable actions other than the proposed actions that are scheduled to occur in the Mud Creek catchment include the Salmonberry #5 commercial thinning project, the Timberline Express Ski Lift at the Timberline Ski Area, the Government Camp fuels reduction project, and trail development in accordance with the Government Camp Trails Master Plan for the Mt. Hood area. None of these projects are in the immediate vicinity of the quarry. No other new quarry operations are proposed in the Mt. Hood National Forest. Past activities within the watershed include previous clearcuts, fire, road construction, and recreation development. No significant adverse cumulative effects are expected from the project, including impacts to transportation systems, recreation, and scenic resources. Minor cumulative detrimental impacts to soils, wildlife habitat, transportation systems, recreation, and scenic resources, and negligible impacts to the watershed are expected. Detailed discussion of these resources is provided in Chapter 3 and the appendices to this FEIS.

The FS has awarded and sold the 31-acre Salmonberry #5 timber sale on the northeast border of the Salmon-Huckleberry Wilderness, within the Salmon River Watershed, southwest of Trillium Lake. It is located west of Fir Tree trail (#674) in T4S, R8E, Section 2. The timber sale includes harvesting 1.45 million board feet of timber and repairing four miles of roads. No new roads would be constructed. The FS is unable to utilize nearby clearcuts to grow huckleberries. Therefore this timber sale on the edge of the Wilderness would be used create more potential huckleberry habitat. The auction date for the sale was June 27, 2003.

The FS is preparing an EIS for the Timberline Express proposal. RLK and Company, the owner and operator of the Timberline Ski Area, proposes to install a new chairlift, install additional night lighting, and expand the existing Special Use Permit boundary by 11 acres in order to accommodate the proposed changes. It is estimated that 88 acres would need to be cleared to implement the project. The new chairlift would provide access to terrain within the existing Special Use Permit boundary that currently is not served by chairlifts. The purpose of the project is to increase winter recreation opportunities at Timberline Ski Area, particularly to provide additional terrain that is sheltered from winter storms, to increase intermediate and high skill-level terrain, to increase night skiing terrain, and to use the existing trail system more efficiently. The FS expects to release the DEIS in summer 2004.

The FS has not yet assessed the traffic, air quality, recreation, and other impacts of the proposed new chairlift and Special Use Permit expansion. However, the project is expected to increase the formal terrain from 456 acres to 512 acres, a 12 percent increase, and to double the capacity for night skiing at Timberline Ski Area, from 990 skiers/riders currently, to 1,890 skiers/riders after construction of the proposed project. Since the increase in use would occur only in the winter ski season, and for night use in particular, traffic conflict impacts, air quality impacts, and other impacts are not likely to compound any impacts of the proposed Tamarack Quarry expansion. Quarry activities would not occur during the winter or at night, except in emergency situations.

The FS is planning a fuels reduction project in the Government Camp vicinity. The project would include approximately 50 acres of mid-seral lodgepole pine stand thinning treatments and potentially some treatment to mid-seral Douglas-fir stands as well.

The Action Alternatives would remove up to 48 acres of currently forested land. Timber removal would occur slowly over a 20-year period. No specific expansion plans have been developed as the expansion would occur as needed. The stands within the expansion area are predominantly open-canopy, early-seral stands. The removal of these stands and other structural stage classes present in the expansion area would comprise less than a one percent reduction of each of these structures within the Salmon River watershed. For example, 28,069 acres of the watershed are stands classified as closed small conifer structure class. Alternative 1 would remove only seven acres of this stand structure, and Alternative 2 would not remove any stands within this stage class. No late-seral structural classes occur in the project area. Revegetation would occur in stages.

The expansion area contains mature, remnant (over 21 in dbh) snags and downed logs. Both Alternative 1 and 2 would remove snag and large down woody debris habitat in the expansion area that may impact sensitive species such as the Pacific fringe-tailed bat, Larch Mountain salamander, Oregon slender salamander, woodpeckers, and Pacific fisher. The Salmon River Watershed Analysis states that snag density in the watershed is low overall due to past high intensity fires and past management practices (FS, 1995). Snag density is low in the Mud Creek catchment; however, the subwatersheds adjacent to the expansion area (East and West Forks and Upper Salmon River) have a high density of large snags.

Higher quality habitat for carnivores such as the wolverine and fisher occur in the adjacent East and West Forks subwatershed and in the Mt. Hood Wilderness in general. The loss of habitat for these species is offset by higher quality adjacent habitat outside of the project area and Matrix land allocations. The adjacent habitat in protected wilderness areas and meadow complexes is expected to provide the primary suitable habitat for listed sensitive wildlife species. Therefore timber removal for the quarry expansion, when combined with other projects such as the Salmonberry #5 timber sale and the Timberline Express, do not represent a cumulative reduction of the mid to later seral stands that are critical to wildlife.

The FS is preparing the Government Camp Trails Master Plan for the southern Mt. Hood area. The FS has begun the NEPA process for the Trails Master Plan and an Environmental

Assessment was released for public comment in July 2005. The NEPA document for the plan includes a proposed trail that would parallel the Tamarack Quarry haul route from Government Camp to Trillium Lake. It would be constructed in 2005 to 2008. Expansion and operations at the quarry would not interfere with the construction or use of the proposed trail. The trail could reduce conflicts between vehicular and pedestrian/bicycle traffic along the haul route. Relocation of the Quarry Connector trail, proposed as part of the quarry expansion project, would complement the proposed parallel trail and would improve the recreation trails network in this area of the Mt. Hood National Forest.

Detrimental soil conditions could be expected to increase in the Mud Creek catchment incrementally over time, particularly with repeated harvest entry where ground-based harvest systems would be employed. Impacts would be isolated to harvest units and minimized to the extent possible by implementing best management practices and Northwest Forest Plan standards and guidelines requiring Riparian Reserve buffers that prevent indirect effects to soil and water resources from accelerated erosion. Overall, accelerated erosion and sedimentation resulting from cumulative actions would increase only slightly over the entire area of the Mud Creek catchment.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Tamarack Quarry Expansion Project

Final Environmental Impact Statement

Chapter 5

Summary of Unavoidable Adverse Effects

Changes between Draft and Final EIS:

Minor corrections, clarifications, and edits were made.

5 SUMMARY OF UNAVOIDABLE ADVERSE EFFECTS

Unavoidable effects are adverse impacts that are expected to occur despite mitigation or for which there is no feasible mitigation. There would be no unavoidable adverse effects to fisheries, wilderness, historic or archaeological resources or in terms of land use and planning, environmental justice, or site contamination.

Scenic Resources: Under Alternative 1, the quarry expansion would daylight into the knoll and be visible from Timberline Lodge in approximately 10 to 15 years. Even though the quarry expansion area would be partially visible, it would be subordinate to the characteristics of the natural landscape, and would meet the VQO of Partial Retention.

The existing quarry is visible from the Sherar Burn huckleberry and bear grass harvesting area, and the proposed expansion would create more of a visual impact to users' experience. Alternative 2 would have less of an impact than Alternative 1. Due to the lack of trees in the Sherar Burn area and the topography between that area and the quarry, views of the quarry from Sherar Burn could not be screened.

For the same reason, both Action Alternatives would have unavoidable impacts to the visual experience of recreation users going to the Salmon-Huckleberry Wilderness on Sherar Burn Road. However, since only about two percent of wilderness users go that route, the impact is considered to be minor.

Transportation/Access: The narrow roadway and limited sight distance, combined with the mix of recreation traffic and large trucks accessing the quarry would increase safety concerns on the haul route, particularly for pedestrians and bicyclists.

Recreation: Conflicts with winter recreation would occur if ODOT were to plow the haul route in emergency situations before April 15. The main portion of the Trillium Lake Loop is a popular cross-country ski trail and winter plowing would displace this activity. Conflicts with spring, summer and fall recreation use, including traffic conflicts (hauling) and noise conflicts (blasting after July 15, crushing, screening, batching, and hauling) would occur on weekdays. Noise from operations would impact weekday recreation, including rifle deer and bull elk hunting in October.

Threatened, Endangered, and Sensitive Species: Both Action Alternatives would unavoidably remove northern spotted owl dispersal habitat, and snag and down woody debris habitat. The project may affect, but is not likely to adversely affect, the northern spotted owl.

Plant Communities: Both Action Alternatives would remove vegetation in the identified plant communities. In addition, Alternative 1 would remove vegetation from the area surveyed as plant community E, which contains potential habitat for *Botrychium* species. Alternative 2 could be designed to avoid expanding the quarry into this area.

Soils and Geology: The potential for sediment transport off site is very high. However, sediment would not reach Mud Creek or other perennial streams. Removal of the soil mantle, in

Tamarack Quarry Expansion Project

Final Environmental Impact Statement

Chapter 6

Short-Term Uses Versus Long-Term Productivity

Changes between Draft and Final EIS:

Minor corrections, clarifications, and edits were made.

6. SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic and other requirements of recent and future generations of Americans.

The purpose of the proposed project is to maintain a safe and efficient transportation system for present and future generations. ODOT would use the extracted rock for road and highway maintenance.

The Multiple Use–Sustained Yield Act of 1960 requires the FS to manage National Forest System lands for multiple uses, including timber, recreation, fish and wildlife, range and watershed. Although the Action Alternatives would alter the long-term productivity of the project area by removing a nonrenewable resource, the extraction and use of rock would comply with applicable LRMP standards. In the short term, adverse impacts to soil resources would result in a loss of long-term site productivity. The site would be converted to a non-forest condition. Reclamation efforts would not restore the capability of the entire site to support dense stands of conifers. The natural capability and productivity of the site would be diminished for the long term. Neither alternative would have long-term impacts on timber, wildlife habitat, soils, water, or recreation resources on surrounding land.

Tamarack Quarry Expansion Project

Final Environmental Impact Statement

Chapter 7

Irreversible or Irretrievable Commitment of Resources

Changes between Draft and Final EIS:

Minor corrections, clarifications, and edits were made.

7. IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

5 IRREVERSIBLE COMMITMENT OF RESOURCES

Irreversible commitment of resources refers to the use of nonrenewable resources such as minerals and petroleum-based fuels. These include actions that disturb either a nonrenewable resource (e.g. cultural resource or extinction of a species) or a resource that only can be renewed in a period of time greater than 100 years, if ever (e.g. mineral source). Both Action Alternatives would require the commitment of rock material. Under Alternative 1, more than two million cubic yards of rock would be removed from the project area and used for road construction and maintenance. Under Alternative 2, up to two million cubic yards of rock would be removed and used for road projects. The No Action Alternative would also remove rock material from the quarry—approximately 750,000 cubic yards. At this time, Tamarack Quarry is the largest known source of high-quality rock near Mt. Hood. Implementation of any alternative would irreversibly deplete this rock source to some extent.

In addition, both Action Alternatives and the No Action Alternative would require the use of fuel for quarry equipment and hauling trucks.

Expansion of the quarry site would alter the natural topography of areas to the east and north of the existing site. Excavation of rock and stockpiling of soil materials would result in large quantities of materials being removed from the site. Reclamation plans would not intend to restore the site to a near natural condition, but rather would be aimed at minimizing surface erosion and establishing effective ground cover.

6 IRRETRIEVABLE COMMITMENT OF RESOURCES

Irretrievable commitments of resources refer to the permanent reduction in the ability to produce a renewable resource. Irretrievable commitments cause the lost production, harvest, or use of a renewable natural resource, such as timber or rangeland. It is the opportunity that is foregone for one use (e.g. mineral extraction or timber production) on a project site when the area is designated and developed with another use (e.g. housing or recreational facilities). An irretrievable impact can be reversed with a change in management direction.

The selection of either Action Alternative would commit the site and public resources to the quarry use and foreclose other land use opportunities. Since the site is in Matrix land, other potential uses include timber production and recreation. Implementation of either Action Alternative would mean that the site could not be used for timber production, recreation, or any other use. However, the quarry use is permitted on Matrix land, and such use is not in conflict with the LRMP objectives or strategies. Alternative 1 would cause a greater irretrievable commitment of resources, since more acres of timber land (41 acres) would be converted to quarry use than under the implementation of Alternative 2 (21 acres).

Tamarack Quarry Expansion Project

Final Environmental Impact Statement

Chapter 8
Consultation and Coordination

Changes between Draft and Final EIS:

(Minor corrections, clarifications, and edits are not included in this list.)

- Added US Environmental Protection Agency

8. CONSULTATION AND COORDINATION

5 CONSULTATION WITH US FISH AND WILDLIFE SERVICE (USFWS)

Consultation was conducted with the USFWS for the northern spotted owl. The Level 1 Team for the Willamette Province has concurred with the effect determination of *may affect, not likely to adversely affect* for the northern spotted owl based on the potential of blasting at the quarry disturbing owls during the breeding season. Representatives from the USFWS and the FS visited the quarry on May 25, 2004 and concurred with the effects analysis in the biological assessment. The USFWS issued a concurrence letter on June 23, 2004 concurring with the effects determination so long as the mitigation measures identified in Section 3.6.3 are implemented.

Based on the Biological Assessment prepared for the project, there is no effect on the bull trout; therefore, consultation is not required for that species.

6 CONSULTATION WITH NATIONAL MARINE FISHERIES SERVICE (NOAA FISHERIES)

No federally listed anadromous fish species or their habitats occur within or near the Tamarack Quarry. A Biological Evaluation determined the proposed action would have no effect on any listed, proposed or sensitive fish species or designated critical habitat. Therefore, consultation with NOAA Fisheries is not necessary.

7 CONSULTATION WITH THE OREGON STATE HISTORIC PRESERVATION OFFICE (SHPO)

The National Historic Preservation Act requires consideration be given to the potential effect of federal undertakings on historic resources. This includes historic and prehistoric cultural resource sites. The guidelines for assessing effects and for consultation are provided in 36 CFR 800. To implement these guidelines, Region 6 of the Forest Service entered an agreement in 1995 with the Oregon SHPO and the Advisory Council on Historic Preservation. In accordance with the agreement, a survey of the project proposed in the Tamarack Quarry area has been conducted. Based on the results of this survey, a “No Effect” determination has been made. The historic and prehistoric sites located within the vicinity would be protected through measures described in Section 3.12 of this FEIS. The FS has an MOU with SHPO that consultation is not required for “no effect” determinations. The Forest Archaeologist has concurred with the determination and therefore consultation with the SHPO is not required.

8 OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

Because ODOT is seeking a special use permit to utilize the Tamarack Quarry for future projects, representatives of both the FS and ODOT have met periodically throughout preparation of the DEIS. Project alternatives were developed in coordination with ODOT. The DEIS, project elements and mitigation measures were reviewed by both agencies.

9 ENVIRONMENTAL PROTECTION AGENCY (EPA)

The development of the reclamation plan was discussed with members from the EPA. The EPA provided guidance on the development of the plan and was provided a draft copy for their review. EPA had only minor comments on the draft plan which were incorporated in the final plan.

Tamarack Quarry Expansion Project

Final Environmental Impact Statement

Chapter 9

List of Preparers

Changes between Draft and Final EIS:

(Minor corrections, clarifications, and edits are not included in this list.)

- Added individuals from ODOT and FS who contributed to the FEIS.

9. LIST OF PREPARERS

Duane Bishop, Zigzag Ranger District Fish Biologist. Reviewed Fisheries Biological Evaluation.

June Carlson, ODOT Region 1 Area Manager Metro-East. Responsible for document quality review. Education: B.S. Landscape Architecture. Experience: 5 years with ODOT.

Gigi Cooper, AICP, Planner. Responsible for Recreation, Land Use and Planning, Air Quality, Noise, Economics, Site Contamination, and Environmental Justice. Education: B.A., Oriental Studies/Political Science; Master of Urban and Regional Planning. Experience: Land use, environmental, and transportation planning; with David Evans and Associates, Inc. since 1996.

Tom Deroo, Mt. Hood National Forest Geologist. Responsible for geological analysis and reclamation plan. Education: B.S. Geology. Experience: 26 years with the USDA Forest Service.

Alan Dyck, Wildlife Biologist. Responsible for review and approval of the BE and BA, and conducting consultation with the USFWS. Education: B.S. Wildlife Management. Experience: 24 years with the following agencies; USDI FWS, USDA Forest Service, USDA Natural Resources Conservation Service and Dept. of Defense.

John L. Fagan, Ph.D., Archaeologist, Archaeological Investigations Northwest Inc. Responsible for Cultural and Historic Resources. Education: B.A., M.A., Ph.D., Anthropology. Experience: Archaeological survey and assessments, artifact analysis, technological analysis; 40 years experience.

Russell Frost, Statewide Material Source Coordinator, Certified Engineering Geologist. Responsible for geological analysis and reclamation plan. Education: B.S Geology. Experience: Material Source Management / Program Development and site specific development and reclamation work for the Oregon Department of Transportation since 1988.

Scott Harmon, EIT, Transportation Analyst. Responsible for Transportation/Access. Education: B.S., Civil Engineering. Experience: Transportation system plans, environmental impact statements, municipal and private development projects, and municipal development review; with David Evans and Associates, Inc. since 1999.

Stephen Hay, Geology Specialist, Geologist-in-Training (GIT). Responsible for geological analysis. Education: B.S. Geology, B.S. Geography. Experience: Engineering Geology, with ODOT since 1999.

Tracii Hickman, Mt Hood NF Fisheries Biologist. Reviewed Fisheries Biological Evaluation. Education: BA Lewis and Clark College 1984, Post graduate studies in Fisheries, Oregon State University. Experience: Fisheries Biologist with the USFS since 1984.

Dave Kennedy, Project Manager and Wildlife Biologist. Responsible for project management and Threatened, Endangered, and Sensitive Wildlife Species. Education: B.A. Outdoor Recreation. Experience: Environmental assessments; environmental impact statements; biological surveys, evaluations and assessments; with David Evans and Associates, Inc. since 1998.

Kristine Marshall, Wildlife Biologist. Responsible for Threatened, Endangered, and Sensitive Wildlife Species and Fisheries. Education: B.S., Biology. Experience: Biological surveys, evaluations and assessments; with David Evans and Associates, Inc. since 1997.

Kristina Gifford McKenzie, Planner. Responsible for Purpose and Need, Alternatives, and Wilderness, and document quality review. Education: B.A., Communications; Master of Urban and Regional Planning. Experience: Land use and environmental planning; with David Evans and Associates, Inc. since 1990.

David Lebo, Mt. Hood National Forest Botanist. Reviewed Botany Biological Evaluation and Noxious Weed Report.

Bruce Newhouse, Botanist, Salix Associates LLC. Responsible for Plant Communities. Education: B.S., Environmental Science. Experience: Botany, wildlife habitat, and wetlands inventory and analysis.

Michael Redmond, Mt. Hood National Forest Environmental Coordinator. Responsible for document quality review and response to comments. Education: B.S. Forest Science 1976, M.S. Forest Science 1981, University of Illinois. Experience: Environmental Planning with USFS since 1978.

Todd Reinwald, Soil Scientist. Responsible for Soils and Hydrology. Education: B.S., Soil Science. Experience: Watershed analysis, channel design and reconstruction, slope stability, erosion control, watershed restoration, and fluvial geomorphology; more than 15 years experience.

Sean Sullivan, Landscape Architect (OR No. 412). Responsible for Scenic Resources. Education: Bachelor of Landscape Architecture; Master of Landscape Architecture. Experience: Aesthetic and recreation resource assessment, visual and environmental mitigation design, visual simulations, and ecological restoration; with David Evans and Associates, Inc. since 1996.

Gillian Zacharias, AICP, Planner. Responsible for document quality review. Education: B.A., History; M.A., International Relations. Experience: Land use and environmental planning; with David Evans and Associates, Inc. since 1997.

Tamarack Quarry Expansion Project
Final Environmental Impact Statement

Chapter 10
Distribution List

Changes between Draft and Final EIS:

(Minor corrections, clarifications, and edits are not included in this list.)

- Added organizations or individuals that commented on the DEIS.

10. DISTRIBUTION LIST

The FEIS or a letter of availability is being sent to the following individuals, groups, and organizations. The list includes federal agencies, American Indian Tribes and Nations, state and local governments, other organizations, and individuals. In addition, the FEIS is available on the internet at: www.fs.fed.us/r6/mthood. Look under "plans and projects" for the document.

5 FEDERAL AGENCIES

Advisory Council on Historic Preservation

Agriculture, US Department of

Forest Service, Pacific Northwest Region
National Agricultural Library
APHIS
Natural Resources Conservation service

Commerce, US Department of

National Marine Fisheries Service

Defense, US Department of

US Army Corps of Engineers

Energy, US Department of

Environmental Protection Agency

Environmental Protection Agency (Seattle and Portland)
Federal Activities Filing Section

Federal Aviation Administration

Interior, US Department of the

Office of Environmental Policy and compliance

Northwest Power Planning Council

Transportation, US Department of

Federal Highway Administration
Office of the Maritime Administration

6 AMERICAN INDIAN TRIBES AND NATIONS

Confederated Tribes of the Warm Springs Indian Reservation

7 STATE AGENCIES

Economic and Community Development Department

Environmental Quality, Department of

Fish and Wildlife, Department of

Forestry, Department of

Geology and Mineral Resources, Department of

Governor's Natural Resources Policy Director

Land Conservation and Development, Department of

Parks and Recreation Department

Public Utilities Commission

State Economist

State Lands, Division of

Water Resources Department

8 LOCAL GOVERNMENTS

Clackamas County, Dept of Transportation and development

City of Sandy, Public Works Director

City of Madras, Public Works Director

9 OTHER ORGANIZATIONS/BUSINESSES

Mt. Hood Cross County Ski Club

Jim Turin & Sons Inc.

Oregon Natural Resources Council

BARK

Timberline Lodge Ski Area

10 INDIVIDUALS

David Butt

Wendy Evans

Larry Hubbard

Tamarack Quarry Expansion Project

Final Environmental Impact Statement

Chapter 11

References Cited

Changes between Draft and Final EIS:

- References for Isaacs, Deroo, Beckman, and Hay updated.

11. REFERENCES CITED

5 PUBLICATIONS AND DOCUMENTS

Archaeological Investigations Northwest, Inc. 2004 (February 17). "Archaeological Survey of the Proposed Tamarack Quarry Expansion Project, Mt. Hood National Forest, Clackamas County, Oregon." Report No. 1149.

Bibb, Rowan. 1988. *Cultural Resource Inventory of the Snowshoe Timber Sale Project Area.* Report No. 88/09/11. Zigzag Ranger District, Mt. Hood National Forest, Zigzag, Oregon.

Bosch and Hewlett. 1982. A review of catchment experiments to determine the effects of vegetation changes in water yield and evapotranspiration. *Journal of Hydrology 55*:3-23.

Clackamas County. 2003a (Last updated April 22). Clackamas County, Oregon Comprehensive Plan.

______. 2003b. Zoning and Development Ordinance.

Dyck, Alan R. 2003 (December 3). "Lynx Effects Determination" Technical Memorandum to Wildlife Biologists, Mt. Hood National Forest. File Code 2670, Mt. Hood National Forest.

Evans, Herbert O. Jr. 1982a. *Cultural Resource Inventory of the Lodge Pole Sales #93, #94 & 95*. Report No. 82/09/09. Mt. Hood National Forest, Sandy, Oregon.

_____. 1982b. *Cultural Resource Inventory of the Trill Special Salvage Timber Sale*. Report No. 82/09/08. Mt. Hood National Forest, Sandy, Oregon.

Franklin, J. F. and C.T. Dyrness. 1969. "Vegetation of Oregon and Washington." US Department of Agriculture, Forest Service, Pacific Northwest Range and Experiment Station. Research Paper PNW-80.

Grauer, Jack. 1975. *Mt. Hood: A Complete History*. Jack Grauer, Portland.

Harr, R.D., W.C. Harper, J.T. Drygier, and F.S. Hsieh. 1975. "Changes in storm hydrographs after road building and clearcutting in the Oregon Coast Range." Water Resources Research. 11(3): 436-444.

Haynes, Bruce. 1988. *Cultural Resource Inventory of the Pepper Timber Sale*. Report No. 88/09/07. Zigzag Ranger District, Mt. Hood National Forest, Zigzag, Oregon.

Howes, S. 1979. "Soil Resource Inventory of the Mt. Hood National Forest." USDA Forest Service, Mt. Hood National Forest.

Isaacs, Frank and Robert J. Anthony. 2004. "Bald Eagle Nest Locations and History of Use in Oregon and the Washington Portion of the Columbia River Recovery Zone, 1971 through 2004." Oregon Cooperative Fish and Wildlife Research Unit, Oregon State University, Corvallis, Oregon.

Jaqua, Jeff M. 1995. *Cultural Resource Inventory of the Salmonberry Timber Sale, North Ridge Area.* Report 96-09-15. Zigzag Ranger District, Mt. Hood National Forest, Zigzag, Oregon.

______. 1997. Site form for 35CL251. On file, State Historic Preservation Office, Salem.

______. 1999. Site form for OR-CL-20. On file, State Historic Preservation Office, Salem.

Livezey, Kent, US Fish and Wildlife Service, Western Washington Fish and Wildlife Office. 2003. "Estimates of distances at which incidental take of murrelets and spotted owls due to harassment are anticipated from sound-generating, forest-management activities in Olympic National Forest."

Marshall, D.G., M.G., Hunter, and A.L. Contreras (editors). 2003. *Birds of Oregon, a General Reference*. Oregon State University Press, Corvallis, Oregon.

Martin, Kathleen. 1997. Site form for Mud Creek Ridge Rock Feature. Region 6, Site No. 669073. On file, Mt. Hood National Forest, Sandy, Oregon.

Marvin, Ron. 1986. *Cultural Resource Inventory of the Division Timber Sale*. Report No. 87/09/01. Zigzag Ranger District, Mt. Hood National Forest, Zigzag, Oregon.

Musser, Lloyd. No date. Site form for Oak Grove Oregon City Wagon Road. Region 6, Site No. 662EA13. On file, Mt. Hood National Forest, Sandy, Oregon.

Oregon Department of Environmental Quality (DEQ). 2003. Oregon's 2002 Water Quality Status Assessment Report (Section 305(b) Report).

______. 2002. "2002 Oregon Air Quality Data Summaries."

______. No date. Oregon DEQ Facility Profiler. Website: http://deq12.deq.state.or.us. Accessed October 6, 2003.

Oregon Department of Fish and Wildlife (ODFW). 2004. 2000 Western Oregon Deer Season Archery and Rifle Harvest. Website: http://www.dfw.state.or.us/ODFWhtml/Wildlife/StatBooks/Table-of-Contents_00htm. Accessed January 14, 2004.

______. 1996 (September). Oregon Wildlife Management Unit Map.

Oregon Department of Land Conservation and Development (DLCD). 2000. Oregon's Statewide Planning Goals & Guidelines. Website: http://www.lcd.state.or.us/goalhtml/goals.html.

Oregon Office of State Fire Marshal (Department of State Police). 2003 (Updated monthly). Community Right-to-Know (CR2K) Hazardous Substance Information Search. Website: http://159.121.82.250. Accessed October 6, 2003.

Salix Associates. 2003 (September 15). "Survey of Rare Vascular and Non-Vascular Plants, Fungi and Lichens for the Tamarack Quarry Proposed Expansion Area."

Thurlkill, Keith. No date. *Cultural Resource Inventory of the Division Timber Sale*. Zigzag Ranger District, Mt. Hood National Forest, Zigzag, Oregon.

US Census Bureau. 2000. Census 2000 Summary File 1 (SF1) and Summary File 3 (SF3).

USDA Forest Service (FS). 1974. *National Forest Landscape Management*, Volume 2, Chapter 1: The Visual Management System, Agriculture Handbook 462.

______, Mt. Hood and Willamette National Forests. 1982. "Plant Association and Management Guide for the Pacific Silver Fir Zone."

______, Mt. Hood National Forest. 1987 (April). "Mt. Hood National Forest Rock Resource Plan."

______, Mt. Hood National Forest. 1990. *Land and Resource Management Plan for the Mt. Hood National Forest.*

______, Mt. Hood National Forest. 1990a. *Final Environmental Impact Statement for the Land and Resource Management Plan, Mt. Hood National Forest.*

______. 1994 (December). "National Strategic Plan for Air Resource Management."

______, Mt. Hood National Forest. 1995. "Salmon River Watershed Analysis." US Forest Service, Mt. Hood National Forest, US Department of Agriculture, Sandy, OR.

______. 2003a (Last updated November 12). National Air Resource Management Program. Air Quality Images. Website: http://www.fsvisimages.com.

_______, Mt. Hood National Forest. 2003b (Last updated June 5; Accessed August 20, 2003). "Mt. Hood Day Hikes." Website: http://www.fs.fed.us/r6/mthood/recreation2003/day-hiking/zigzag-rd.shtml.

_______, Mt. Hood National Forest. 2003c (Last updated August 8; Accessed August 20, 2003). Recreation Information 2003—Trail Report for Zigzag Ranger District. Website: http://www.fs.fed.us/r6/mthood/recreation2003/trails/zigzag-ranger-district.shtml.

USDA Forest Service and USDI Bureau of Land Management (FS and BLM). 1994 (April). "Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl. Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest related Species within the Range of the Northern Spotted Owl."

_______. 2001 (January). "Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines.

_______. 2004a (March). "Record of Decision to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl."

_______. 2004b (March). "Record of Decision Amending Resource Management Plans for Seven Bureau of Land Management Districts and Land and Resource Management Plans for Nineteen National Forests Within the Range of the Northern Spotted Owl."

USDI Bureau of Land Management and USDA Forest Service (BLM and FS). 2002. "The Willamette Providence Fiscal Year 2002 Habitat Modification Programmatic Biological Assessment for Effects to Listed Species."

US Environmental Protection Agency. 2003 (October 3 last updated). Superfund. Website: http://www.epa.gov/superfund/ sites/locate/index.htm. Accessed October 3, 2003.

US Environmental Protection Agency and USDA Forest Service (EPA and FS). 1980. *An Approach to Water Resources Evaluation of Non-point Sources-Silviculture*. EPA-IGA-D6-0660. Washington, DC. As cited in USDA Forest Service, Mt. Hood National Forest, "Salmon River Watershed Analysis," 1995.

Walker, Kathleen, Recreation Assistant, Zigzag Ranger District, US Forest Service, Mt. Hood National Forest. 2003 (January 27). Memorandum to Jim Tierney, Engineering, US Forest Service, Mt. Hood National Forest.

Wildt, Chris. 1993. *Cultural Resource Inventory of the Mud Creek Pot Holes Development*. Report No. 94/09/01. Hood River District, Mt. Hood National Forest, Mt. Hood-Parkdale, Oregon.

6 PERSONAL COMMUNICATIONS

Barnhart, William, District Manager, Oregon Department of Transportation. Electronic mail. June 19 and 24, 2003, and May 25, 2004.

Beckman, Patrick Sr., Maintenance Supervisor, Oregon Department of Transportation. Telephone conversation. September 16, 2005.

Deroo, Tom, Forest Geologist, US Forest Service, Mt. Hood National Forest. Spring 2003, Summer 2005.

Fritz, Greg, Planner, Clackamas County Department of Transportation and Development. Telephone conversation. September 3, 2003.

Glasgow, Clay, Planner, Clackamas County Department of Transportation and Development. Telephone conversation. September 3, 2003.

Hay, Steven, Geology Specialist Oregon Department of Transportation. Electronic mail. December 15, 2004.

Hurtado, Joel, Biologist, Oregon Department of Fish and Wildlife. Telephone conversation. January 14, 2004.

Moore, Martha, Principal, TW Environmental, Inc. 2004 (January 27 and February 3). Telephone conversations.

Moore, Randy, Reclamationist, DOGAMI. Telephone conversation. September 15, 2003.

Norman, Paul, Special Uses/Lands, Zigzag Ranger District, US Forest Service, Mt. Hood National Forest. 2003a (February 21). Telephone conversation.

_____. 2003b (September 16). Electronic mail.

Pelles-Madrid, Colleen, District Ranger, Zigzag Ranger District, US Forest Service, Mt. Hood National Forest. Meeting. January 27, 2003.

Turin, Dan, Jim Turin & Sons Inc. 2004 (March 8). Telephone conversation.

Walker, Kathleen, Recreation Assistant, Zigzag Ranger District, US Forest Service, Mt. Hood National Forest. Electronic mail communication. September 16, 2003. Sent to James Tierney, Infrastructure Team Leader, Clackamas River Ranger District, US Forest Service, Mt. Hood National Forest.

Walker, Kathleen, Recreation Assistant, Zigzag Ranger District, US Forest Service, Mt. Hood National Forest. Electronic mail communication. February 2, 2004.

Tamarack Quarry Expansion Project

Final Environmental Impact Statement

Chapter 12
Glossary of Terms

Minor corrections, clarifications, and edits are not included in this list.

12. GLOSSARY OF TERMS

Adverse impact – unfavorable, harmful, or detrimental environmental changes. Adverse impacts may be significant or not significant.

Alluvium – material transported and deposited by a stream or river, usually a coarse deposit composed of sand and rock.

Anadromous fish – those species of fish that mature in the sea and migrate into streams to spawn. Salmon, steelhead, and shad are examples.

Artifact – a single, portable object, made or altered by a human(s); usually culturally diagnostic.

Available runoff – total precipitation less evapotranspiration and infiltration. The amount of water not lost to infiltration into the soil, or uptake and transpiration by plants, or evaporation.

Average daily traffic (ADT) – the weighted 24 hour total of all vehicle trips to and from a site Monday through Friday.

Background – the visible terrain beyond the foreground and middleground where individual trees are not visible but are blended into the total fabric of the forest stand (see foreground and middleground).

Catchment –a 7th field hydrologic unit or drainage nested within a larger 6th field subwatershed. For example, the Mud Creek catchment is one of the smaller drainages that comprise the larger West and East Forks of the Salmon River 6th field subwatershed.

Class I Wilderness – a wilderness over 5,000 acres that was in existence as of August 7, 1977. All other National Forest System lands are Class II, including new wildernesses and expansions to Class I wildernesses that occurred after August 7, 1977.

Cultural resources – The cultural foundation of the US includes the remains or records of districts, sites, structures, buildings, networks, neighborhoods, memorials, objects, and events from the past that have scientific, historic, or cultural value. They may be historic, prehistoric, archaeological, or architectural in nature. Cultural resources are an irreplaceable and nonrenewable aspect of our national heritage.

Cumulative effects – the combined effects of two or more management activities. The effects may be related to the number of individual activities or to the number of repeated activities on the same piece of ground. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Dispersal habitat – Dispersal only habitat for the northern spotted owl generally consists of mid-seral stands between 40 to 80 years of age with canopy closures of 40 percent or greater and with trees of a mean dbh of 11 inches or greater (BLM and FS, 2002).

Dispersed recreation – outdoor recreation that takes place outside developed recreation sites or the Wilderness.

Disturbance regime – natural pattern of periodic disturbances, such as fire or flood, followed by a period of recovery from the disturbance, such as regrowth of a forest after fire.

Diversity – the distribution and abundance of different plant and animal communities and species within the area covered by a LRMP.

Effect/impact – environmental consequences as a result of a proposed action. Included are direct effects, which are caused by the action and occur at the same time and place, and indirect effects, which are caused by the action and are later in time or further removed in distance, but which are still reasonably foreseeable. Indirect effects may include population-growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air, water, and other natural systems, including ecosystems.

The terms “effects” and “impacts” as used in this statement are synonymous. Effects may be ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic quality, historic, cultural, economic, social, or health-related, whether direct, indirect, or cumulative. Effects resulting from actions may have both beneficial and detrimental aspects, even if on balance the agency believes that the overall effects would be beneficial (40 CFR 1508.8).

Effective ground cover – a continuous cover of organic material, such as plants or plant residues, like litter or duff, that protects soil materials from erosive forces.

Endangered species – any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Not included are members of the class Insects that have been determined by the Secretary to constitute a pest whose protection under the provisions of the Endangered Species Act of 1973 would present an overwhelming and overriding risk to man. An endangered species must be designated in the Federal Register by the appropriate Federal Agency Secretary.

Environment – the physical conditions that exist within the area that would be affected by a proposed project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historical or aesthetic significance. The “environment” includes both natural and manmade conditions.

Ephemeral stream – a stream or portion of a stream that flows only in direct response to precipitation or snow melt. It receives little or no water from springs and no long-continued supply from snow or other sources. Ephemeral drainages frequently have no permanent or well-defined channels, but follow slight depressions in the natural contour of the ground surface.

Erosion (accelerated) – erosion much more rapid than normal, primarily as a result of human influence or activities.

Erosion (surface) – wearing away of the earth's surface by water, ice, wind, or other natural agents under natural environmental conditions of climate, vegetation, etc., undisturbed by human influences.

Foreground – a term used in visual (scenery) management to describe the stand of trees immediately adjacent to a high-value scenic area, recreation facility, or forest highway (see background and middleground).

Glacial till – unstratified glacial drift deposited directly by ice and consisting of clay, sand, gravel, and boulders intermingled in any proportion.

Groundwater – water under the earth's surface, often confined to aquifers capable of supplying wells and springs.

Gully/rill erosion – the dislodgement of soil particles by a concentrated flow of water.

Habitat – a place where a plant or animal naturally or normally lives and grows.

Hazardous material – a material or form of energy that could cause injury or illness in humans, animals, or the natural environment.

Hydrology – the scientific study of the properties, distribution, and effects of water in the atmosphere, on the earth's surface, and in soil and rocks.

Igneous rock – rock that has formed by the cooling and consolidation of viscous rock, or magma.

Indicator species – a wildlife management scheme in which the welfare of a selected species is presumed to indicate the welfare of other species.

Intermittent stream – a stream that flows above ground at intervals or only flows periodically during the year. In contrast to ephemeral drainages (see definition), intermittent streams generally have well-defined channels.

Land use – the purpose or activity for which a piece of land or its buildings is designed, arranged, or intended, or for which it is occupied or maintained.

Mass wasting – the dislodgment and downhill transport of soil and rock materials under the influence of gravity. Many classifications of mass movement are identified, including soil creep, debris slides, rotational slides or slumps, and rock slides.

Matrix – federal lands outside of reserves, withdrawn areas, and Managed Late-Successional areas on which timber harvest and other silvicultural activities are allowed.

Middleground – the visible terrain beyond the foreground where individual trees are still visible but do not stand out distinctly from the stand.

Mitigation measures – actions to avoid, reduce, eliminate, or rectify the impact of a management practice or proposed action.

National Environmental Policy Act (NEPA) – an Act to declare a national policy that will encourage productive and enjoyable harmony between humans and their environment; to promote efforts that will prevent or eliminate damage to the environment and biosphere, and stimulate the health and welfare of humans; to enrich the understanding of the ecological systems and natural resources important to the nation; and to establish a Council on Environmental Quality.

Noxious weed – a plant considered to be extremely destructive or harmful to agriculture and designated by law. An undesirable species that conflicts with, restricts, or otherwise causes problems with management objectives.

Peak hour – in reference to transportation systems, the hour during which the highest percentage of traffic flow occurs.

Plant community – a vegetation complex unique in its combination of plants that occur in particular locations under particular influences. A plant community is a reflection of integrated environmental influences on the site, such as soils, temperature, elevation, solar radiation, slope, aspect, and rainfall.

Riparian – pertaining to areas of land directly influenced by water. Riparian areas usually have visible vegetative or physical characteristics reflecting this water influence. Streamsides, lake borders, or marshes and wetlands are typical riparian areas.

Riparian area – geographically delineated areas, with distinctive resource values and characteristics, that are composed of aquatic and riparian ecosystems. On the Mt. Hood National Forest, riparian areas typically include areas adjacent to all streams, lakes, and ponds, and areas comprising seeps, springs, and wetlands.

Salmonid – resembling or characteristic of a salmon; of or belonging to the family *Salmonidae*, which includes salmon, trout, and whitefish.

Seep – a site where groundwater is present at the surface.

Sensitive species –those species of plants or animals that have appeared in the Federal Register as proposed for classification and are under considerations for official listing as endangered or threatened species, that are on an official state list, or that are recognized by the Regional Forester as needing special management to prevent their being placed on federal or state lists.

Seral – a biotic community that is a developmental, transitory stage in an ecological succession.

Soil creep – the slow, downslope movement of weathered rock fragments and soil.

Stream order – the hierarchical ordering of streams based on the degree of branching. A first-order stream is an unforked or unbranched stream. Two first-order streams flow together to form a second-order stream, two second-order streams flow together to form a third-order stream, and so on.

Subwatershed – a 6th field hydrologic unit or drainage nested within a larger, 5th field hydrologic unit known as a watershed. For example: The West and East Forks of the Salmon River is just one of many 6th field hydrologic units or subwatersheds that comprise the larger Salmon River Watershed.

Thalli – pl. of thallus. The plant body of a thallophyte, which includes plant forms consisting of one cell and cell aggregates not clearly differentiated into root, stem, and leaf, including bacteria, algae, fungi, and lichens.

Threatened species – any species of animal or plant that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range and that has been designated in the Federal Register by the Secretary of Interior as a threatened species.

Topography – the graphical description on a map of the exact physical configuration of a place or region; the features of a place or region.

Viewpoint – a location from which a site is visible.

Viewshed – the total landscape seen or potentially seen from all or a logical part of a travel route, use area, or water body.

Visual Quality Objective (VQO) – a category of acceptable landscape alteration measured in degrees of deviation from the natural-appearing landscape.

Watershed – the line separating head-streams that flow into different river systems. It may be sharply defined (crest of a ridge) or indeterminate (in a low, undulating area).

Wetlands – areas that are inundated by surface or groundwater with a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Under normal circumstances the area does or would support a prevalence of vegetative or aquatic lift. Wetlands generally include swamps, marshes, bogs, and similar areas. As defined by federal agencies, wetlands are areas that contain soils showing signs of frequent and/or sustained inundation, plant species adapted to wet conditions, and signs of water movement through the area.

[illegible]

Tamarack Quarry Expansion Project

Final Environmental Impact Statement

Chapter 13
Index

Minor corrections, clarifications, and edits are not included in this list.

13. INDEX

Appendix A: Visual Resources Report

(No changes between Draft and Final EIS)

Visual Resources Technical Report

Tamarack Quarry Expansion Project

Mt. Hood National Forest

US Department of Agriculture, Forest Service
Mt. Hood National Forest

March 2004

Acronyms and Abbreviations

DEA	David Evans and Associates, Inc.
DEM	digital elevation model
DOGAMI	Department of Geology and Mineral Industries
FEIS	Final Environmental Impact Statement
FS	Forest Service
GIS	Geographic Information System
LRMP	Land and Resource Management Plan for the Mt. Hood National Forest
ODOT	Oregon Department of Transportation
USDA	US Department of Agriculture
USGS	US Geological Survey
VMS	Visual Management System
VQO	Visual Quality Objective

Table of Contents

List of Tables

List of Figures

1 INTRODUCTION

The US Forest Service (FS) contracted with David Evans and Associates, Inc. (DEA) to conduct a visual resource assessment study to determine and assess the impacts of a proposed quarry expansion on the visual environment in the Mt. Hood National Forest. This technical report presents the findings and recommendations of the study.

1.1 PROJECT AREA LOCATION AND DESCRIPTION

The project area is approximately four miles south of Government Camp and US Highway 26 (US 26), in Section 2, Township 4 South, Range 8½ East, Willamette Meridian, Clackamas County, Oregon, on the Mt. Hood National Forest. The Tamarack Quarry is approximately 1.5 miles south of Trillium Lake. Figure 1 shows the project area and location. The haul route for the quarry is along FS roads 2656 and 2656-955.

The project area encompasses approximately 48 acres adjacent to (generally north and east of) the existing Tamarack Quarry. The existing quarry occupies approximately 22 acres, although it is currently permitted to expand to 29 acres (Oregon Department of Geology and Mineral Industries [DOGAMI] Permit Number 03-0092).

Two perennial streams are near the project area. The first is Mud Creek, the only named stream near the project site, which issues from Trillium Lake. The other is an unnamed stream originating from Summit Meadows. Both are headwater tributaries to the Salmon River. The entire length of the Salmon River, from its headwaters to its confluence with the Sandy River, is designated a Wild and Scenic River. The Sandy River is designated Wild and Scenic from its headwaters to the Mt. Hood National Forest boundary.[1]

1.2 PROPOSED ACTION

The proposed action is to expand the existing Tamarack Quarry (formerly known as the Mud Creek Quarry) to encompass up to 70 acres of National Forest System land. Rock would be excavated from the existing quarry and the expansion area. The excavated material would be used by ODOT and the FS for road maintenance and construction, including improvements to US 26 and Oregon Route (OR) 35. Other uses may include road closures and site restoration, such as stream projects.

Vegetation removal and rock excavation would occur over the next 20 years, as rock is needed. ODOT anticipates removing 40,000 to 100,000 cubic yards of rock per year, although needs would vary with annual road and weather conditions. The FS would extract less than 10,000 cubic yards of rock per year for project work other than emergencies. ODOT and the FS would extract rock from the remaining seven acres

[1] In 1968, Congress enacted the Wild and Scenic Rivers Act to preserve the free-flowing conditions of and protect the immediate environment of selected rivers that possess outstandingly remarkable scenic, recreational, fish and wildlife, or other values.

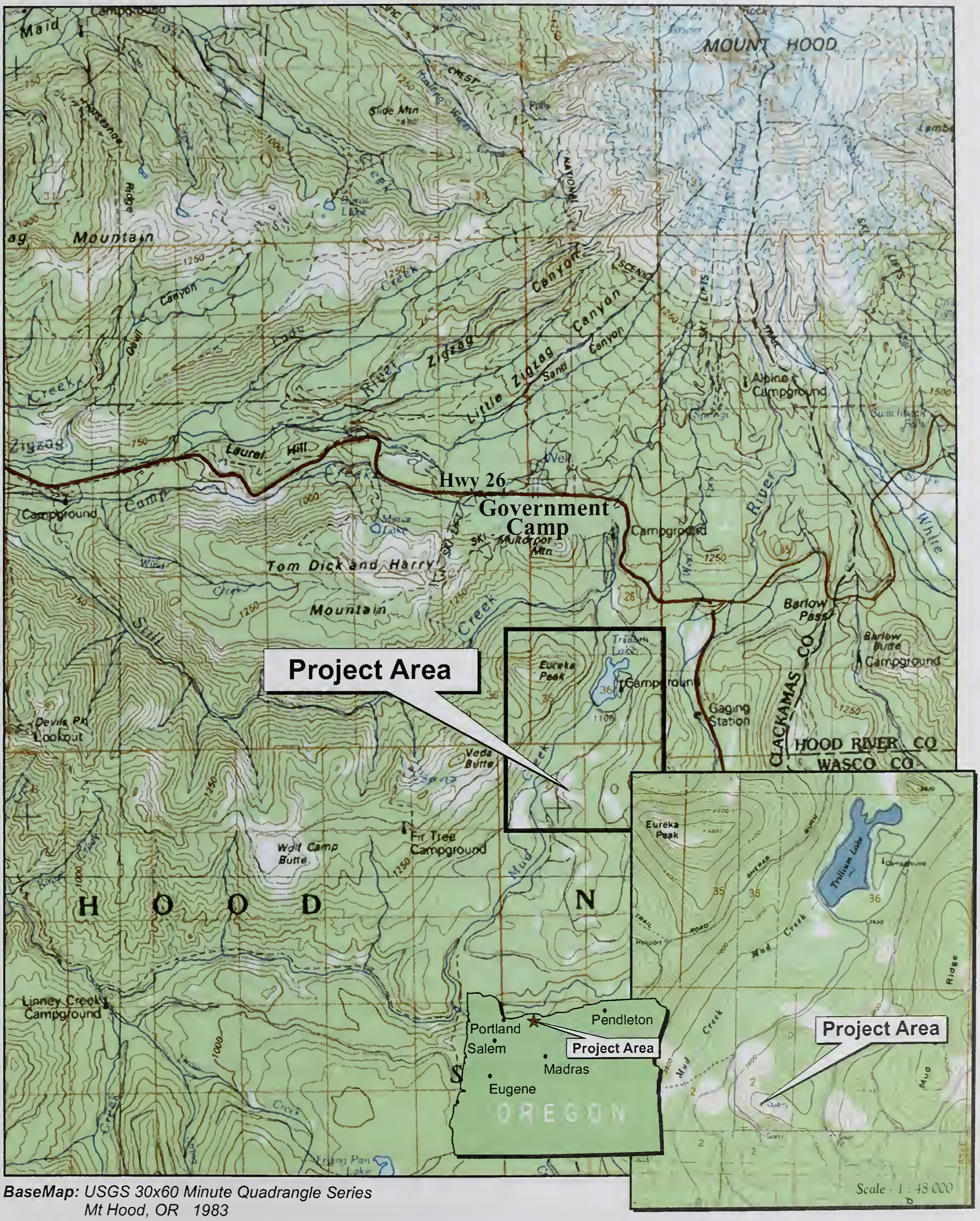
within the current permitted area prior to entering the expansion area. All existing vegetation in the expansion area would be removed for quarry operations.

Activities would include clearing vegetation, blasting, rock crushing, screening, batching, loading and hauling, importing excess materials (such as from slides and ditch cleanings) for reprocessing or quarry reclamation, and short-term stockpiling of excavated rock and soils. Materials would be stockpiled on-site either for reprocessing or for use in reclamation. Rock for sanding roads would be hauled out of the quarry and stockpiled at various locations: the junction of US 26 and OR 35, the Government Camp maintenance station, Bennett Pass, Parkdale, and the junction of OR 216 and US 26. Construction rock would be quarried as needed and used shortly after crushing.

Activities would be subject to timing restrictions. Blasting would be allowed after July 15 only. No noise-generating or hauling activities would occur at night, on weekends, during holidays, or any time between the first measurable snowfall and mid-April, except for emergencies. ODOT would be responsible for plowing two lanes with turnouts on the haul route, as needed, as early as the second full week of April. Typically the FS opens the road a week or two prior to Memorial Day weekend.

The haul route from its junction with US 26 to the quarry is approximately 3.1 miles long, entirely on National Forest System lands, and includes FS roads 2656 and 2656-955. FS road 2656 is surfaced with asphalt. FS spur road 955 is gravel surfaced. No improvements would be made to the haul route except for routine maintenance, which may include resurfacing, structural repairs, striping, placement of safety reflectors, and placement of additional traffic signs. ODOT would pay for a commensurate portion of haul route maintenance. Traffic control, which may include flaggers and signs, would be implemented during hauling. Typical hauling trucks have a 20-cubic-yard capacity. No culvert replacements, road widening, pull-out or turn-around construction would occur as part of the proposed action.

A FS geologist estimated the remaining volume of good quality rock to be at least two million cubic yards. The geologist estimated the volume of the remaining in-place rock based on the topographic information from a 1”=100’ site map, the location of surface outcrops, limited drill hole information, an assumption that good quality rock extends north beyond the drill hole locations for about 250 feet, and allowing for 20 percent of the volume to be soil and poor quality rock. The basic assumption is that the spur ridge landform is mostly underlain by the same andesite rock unit. Due to the extensive rock outcrops on the south side of the spur ridge there was little need for subsurface exploration until plans developed to excavate an upper bench. The FS drilled three exploratory holes in 1978. These drill holes are located approximately 150 feet northeast of the present quarry development limit. The drill holes were approximately 120 to 200 feet deep and indicated there is 180 feet or more of good quality rock below about 6 to 20 feet of soil. Additional drilling would be completed to verify the presence of good quality rock before expansion.



BaseMap: *USGS 30x60 Minute Quadrangle Series*
Mt Hood, OR 1983

Inset Map: *USGS 7.5 Minute Quadrangle Series*
Mt Hood South, OR 1980; Government Camp, OR 1980; Wolf Peak, OR 1985; Wapinitia Pass, OR 1985

Figure 1
Vicinity

Scale - 1 : 100 000

necessary to meet future demand. ODOT has expressed that, in order to provide a safe and cost-efficient highway system near Mt. Hood, a secure, long-term source of material near Mt. Hood is essential. The need for sanding material has also become critical since the previous primary source of material (White River) is no longer available.

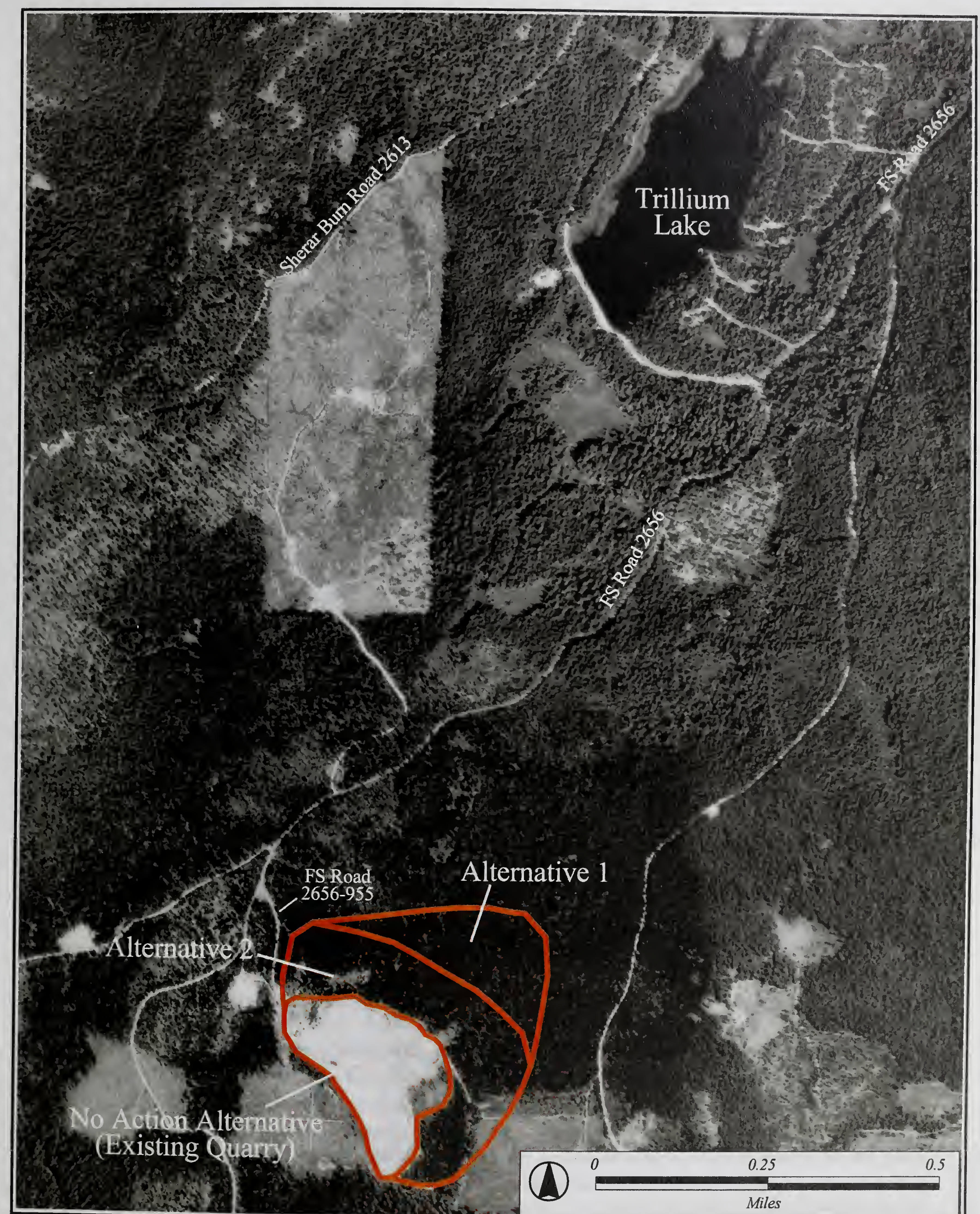
Through analysis, ODOT and the FS have determined that the site of the Tamarack Quarry is preferred over other quarry sites in the vicinity of Mt. Hood. Tamarack Quarry has the potential to be a relatively large quarry. It has been excavated and managed in a manner that facilitates continued excavation and appears to have reserves of quality source rock. The quarry has a relatively short haul route (approximately 3.1 miles) to US 26. However, the size of the existing quarry is inadequate to provide the amount of rock material needed over the next 20 years. Therefore, the quarry needs to be expanded.

1.4 ALTERNATIVES UNDER CONSIDERATION

1.4.1 Alternative 1

Alternative 1 would expand the Tamarack Quarry by approximately 41 acres more than what is currently permitted, for a total area of approximately 70 acres (see Figure 2). Expansion would occur to the north and east of the existing quarry as shown on Figure 2. All existing vegetation would be removed within the 41-acre expansion area. Rock would be excavated first from the remaining seven acres in the currently permitted area, then in the expansion area. The excavated material would be used by ODOT and the FS for road maintenance and construction, including improvements to US 26 and OR 35. The amount of material ODOT would remove each year could range from fewer than 40,000 cubic yards to more than 100,000 cubic yards. According to preliminary estimates by the FS, the total expanded quarry area with Alternative 1 would contain in excess of two million cubic yards of material. Based on extracting 100,000 cubic yards per year, ODOT and the FS would use the quarry for 20 years or more.

Activities would include clearing vegetation, blasting, rock crushing, screening, batching, loading and hauling, importing excess materials (e.g., soils for reclamation and rock from off-site), and some short-term stockpiling of excavated rock and soils. Table 1-1 shows when various activities would be permitted. No noise-generating or hauling activities would occur at night, on weekends, during holidays, or any time between the first measurable snowfall and mid-April, except for emergencies. ODOT would be responsible for plowing two lanes with turnouts on the haul route, as needed, as early as the second full week of April. Typically the FS opens the road one or two weeks prior to Memorial Day weekend.



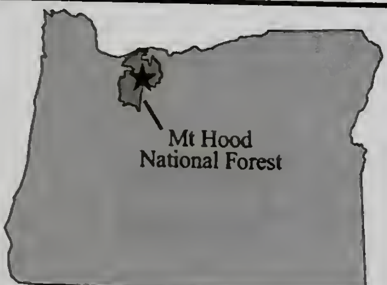


Figure 2
Alternatives Under Consideration

Table 1-1. Dates and Times During which Quarry Activities Would Be Permitted

Activity	Dates	Days and Hours*
Blasting	July 16 – first measurable snowfall (typically in November)	Mon.-Thu. 10 AM to 5 PM Fri. 10 AM to 12 PM
Crushing Screening Batching	Mid-April – first measurable snowfall (typically in November)	Mon.-Thu. 7 AM to 7 PM Fri. 7 AM to 12 PM
Blast Day Preparation Batch Plant Daily Preparation Equipment Repair General Equipment Maintenance (fueling and servicing) Dust Abatement (pre- and post-shift each day)	Mid-April – first measurable snowfall (typically in November)	Days and hours not restricted
Hauling (i.e., large trucks, including semis and rock trucks, on the haul route) Loading	Mid-April – first measurable snowfall (typically in November)	Mon.-Thu. 7 AM to 5 PM Fri. 7 AM to 12 PM

* *No activities would be permitted on federal holidays. Restrictions could be modified after Labor Day subject to approval by the FS.*

To minimize potential conflicts with recreation traffic, hauling would not occur on weekends beginning on Fridays at noon, or on federal holidays, unless the quarry is being used for emergency road repairs. When hauling would occur, ODOT would implement traffic control measures (e.g., flagging, temporary signage).

No improvements would be made to the haul route except for routine maintenance, which may include resurfacing, structural repairs, striping, placement of safety reflectors, and placement of additional traffic signs. ODOT would pay for a commensurate portion of haul route maintenance. Traffic control, which may include flaggers and signs, would be implemented during hauling. Typical hauling trucks have a 20-cubic-yard capacity. No culvert replacements, road widening, pull-out or turn-around construction would occur as part of this alternative.

To provide a better trail connection and continued year-round use of the quarry for recreation, the FS would relocate the Quarry Connector trail around the quarry and maintain it for winter cross-country skiing (suitable for beginner to intermediate skiers) and summer mountain biking use (suitable for intermediate bikers), as part of the proposed project. ODOT would pay for the trail relocation. The route would be at a grade of less than eight percent with rest grades approximately every 200 feet to accommodate mountain bikers in the summer use season. It would be suitable for grooming with a snow

groomer. Quarry operations would maintain the designed location and grade of the route into the future.

Under Alternative 1 (as with Alternative 2), detailed excavation and reclamation plans would be developed, approved by the FS, and implemented as expansion occurs. Overburden soil has been and would continue to be saved for use during later reclamation of the quarry. The soil would be pushed back into the quarry benches and floors and planted with erosion-preventing, native grasses and other vegetation when the excavation is completed. Portions of the quarry could be reclaimed in stages, depending on the final quarry excavation plan.

1.4.2 Alternative 2

With Alternative 2, the Tamarack Quarry would be expanded by approximately 21 acres over the currently permitted 29 acres, for a total area of approximately 50 acres. The expansion would occur primarily toward the north and east, as shown on Figure 2, but the smaller expansion area would reduce visual impacts of the quarry when viewed from the Timberline Lodge area. All existing vegetation would be removed within the 21-acre expansion area. Rock would be excavated first from the remaining seven acres in the currently permitted area, then from the expansion area. The excavated material would be used by ODOT and the FS for road maintenance and construction, including improvements to US 26 and OR 35. The amount of material ODOT would remove each year could range from fewer than 40,000 cubic yards to more than 100,000 cubic yards. According to preliminary estimates by the FS, the total quarry area with Alternative 2 would contain up to two million cubic yards of material. Based on extracting 100,000 cubic yards per year, ODOT and the FS would use the quarry for approximately 20 years.

Activities would be similar to those described for Alternative 1, with timing restrictions as shown in Table 1-1. Blasting would be allowed after July 15 only. No noise-generating or hauling activities would occur at night, on weekends, during holidays, or any time between the first measurable snowfall and mid-April, except for emergencies. ODOT would be responsible for plowing two lanes with turnouts on the haul route, as needed, as early as the second full week of April. Typically the FS opens the road a week or two prior to Memorial Day weekend.

To minimize potential conflicts with recreation traffic, hauling would not occur on weekends beginning on Fridays at noon, or on federal holidays, unless the quarry is being used for emergency road repairs. When hauling would occur, ODOT would implement traffic control measures (e.g., flagging, temporary signage).

The Quarry Connector trail would be relocated, as described under Alternative 1.

Similar to Alternative 1, no improvements would be made to the haul route except for routine maintenance, which may include resurfacing, structural repairs, striping, placement of safety reflectors, and placement of additional traffic signs. ODOT would pay for a commensurate portion of haul route maintenance. Traffic control, which may include flaggers and signs, would be implemented during hauling. Typical hauling trucks have a 20-cubic-yard capacity. No culvert replacements, road widening, pull-out or turn-around construction would occur as part of Alternative 2.

Detailed excavation and reclamation plans would be developed, approved by the FS, and implemented as expansion occurs. Generally, reclamation would occur as described for Alternative 1.

1.4.3 No Action Alternative

The quarry would not be expanded under the No Action Alternative. The FS would be the primary user of the quarry and would continue to extract rock from the site within the existing permitted boundaries (approximately 29 acres). The FS estimates that the existing quarry would yield approximately 750,000 additional cubic yards of material.

To meet projected needs maintenance and construction projects, the FS may need to supplement the material removed from the Tamarack Quarry with material from other sources, and ODOT would need to obtain material from other sources. Those sources may include other quarries in the Forest as well as private, commercial suppliers.

Currently, ODOT has only one private supplier as a potential source (Barnhart, pers. comm., 2003). It is the nearest commercial quarry to the Mt. Hood area and is approximately 20 miles from Tamarack Quarry. Other commercial suppliers are considerably farther from the area, and transporting rock from those suppliers would be cost-prohibitive (Barnhart, pers. comm., 2004). Current price is approximately $16 per cubic yard of material (Barnhart, pers. comm., 2003). Assuming ODOT uses an average of 100,000 cubic yards of material each year, the annual cost of using a private supplier would be in excess of $1.6 million.

Activities within the existing permit area would be similar to those described for Alternative 1, although less activity would occur each year with the FS as the primary user. Activities, including hauling, would occur on weekdays (Mondays through Thursdays from 7:00 a.m. to 5:00 p.m., and Fridays from 7:00 a.m. to noon) during the spring, summer, and fall when the haul road is clear of snow. Blasting would be allowed only after July 15 of each year. The haul route would receive normal maintenance. Expansion to the currently permitted boundaries would affect the Quarry Connector trail, which would be relocated under the No Action Alternative.

The quarry is operated under a DOGAMI permit (permit number 03-0092). DOGAMI has a reclamation plan on file for the quarry. According to the reclamation plan for the

No Action Alternative, reclamation would begin 30 days after mining is completed at the quarry. Topsoil and overburden piles would be seeded for stabilization, and all areas where overburden is replaced would be stabilized. Because natural landform and existing vegetation provide screening for the quarry, additional screening would not be needed. A vegetated buffer of at least 1,000 feet would provide screening around the entire quarry once mining is completed. All structures, equipment, and refuse would be removed from the site prior to completing reclamation. Benches would be cut into vertical slopes. Topsoil would be stored on-site, then replaced and seeded with species recommended by the FS. Planting methods and times would also be in accordance with FS recommendations.

2 METHODS

The FS and DEA collaborated to develop the purpose and need statement for the proposed project. Once the project purpose and need were understood, DEA identified a key observation point, established baseline conditions at the project site, and gained an understanding of management guidelines affecting the visual environment. This was accomplished through meetings with FS and ODOT staff, literature review and background research, a seen area analysis, and site reconnaissance. DEA then created a visual simulation to model likely future conditions for the two action alternatives. These models were used to compare the likely future conditions against the criteria established in the management guidelines. Mitigation measures were then proposed to offset probable impacts resulting from the development of the project.

2.1 LITERATURE REVIEW AND BACKGROUND RESEARCH

Relevant and available documents were reviewed by DEA. Of special value were the LRMP and the Final Environmental Impact Statement (FEIS) for the LRMP. Other documents reviewed included initial public comment to the proposed actions, various draft reports, agency meeting minutes, and FS and ODOT correspondence regarding the need and coordination of various aspects of the proposed project.

DEA also met on several occasions with FS and ODOT staff to discuss the project and gain agency insight to key viewing areas, user concerns, and potential mitigation measures.

2.2 SEEN AREA ANALYSIS

In order to determine the likely viewshed from which the proposed project would be visible, DEA conducted a seen area analysis. Ten-meter digital elevation models (DEMs) and Mt. Hood National Forest vegetation classification geographical information system (GIS) data were downloaded from the Regional Ecosystem Office Internet site. Canopy height values were assigned to the FS vegetation polygons and later ground-truthed for accuracy. The canopy heights were then overlaid onto the DEMs to simulate the elevation of the top of the canopy. A visibility analysis was performed on the top-of-canopy-DEM,

identifying areas visible from Timberline Lodge. Several potential quarry configurations were extracted from the top-of-canopy-DEM, and the visibility analysis was re-run for each potential quarry configuration.

The GIS analysis was also used to determine the approximate limits of expansion for Alternative 2. The limits were established by modeling the area of expansion at which the proposed activities would just become visible.

2.3 SITE RECONNAISSANCE

Site visits to Timberline Lodge were conducted on January 20 and February 20, 2003, to document the existing landscape character, and to consider views and potential impacts seen from the lodge. Photographs of the project site were taken from several locations at the lodge for use in visual simulations described below.

A site visit to the quarry was conducted in March 2003 to ground-truth the forest stand heights and GIS modeling. During that visit, it was also confirmed that the proposed expansion would not be visible from Trillium Lake and its associated campground because the site is screened by vegetation and landform.

2.4 VISUAL SIMULATIONS

A visual simulation was prepared for Alternatives 1 and 2 to estimate the probable impacts to the landscape. Using AutoCAD 3D modeling tools and Photoshop computer software, DEA created a topographic model of the two build alternatives, created a line and angle of sight from which to view the model based on the location of the key observation point (Timberline Lodge), determined the areas visible along that sightline, and created a visual simulation of likely impacts by superimposing the models of the two build alternatives over a recent photograph taken from the key observation point.

2.5 COMPARISON OF PROPOSED ACTIONS AGAINST MANAGEMENT REQUIREMENTS

To determine compliance with management requirements, DEA used the visual simulations to compare the project alternatives to the existing landscape character in terms of scale, size, extent, and the amount of contrast in form, line, color, and texture as viewed from the key observation point. This method relies primarily on professional judgment because there are no quantifiable interval measurements that can be used as thresholds.

The primary criterion for determining the project's effect is the Visual Quality Objective (VQO) that would result from the proposed action (i.e., implementing one of the project alternatives). Failure to achieve the VQO specified in the management guidelines would result in an "adverse" effect. Achievement of the specified VQO would result in a

"neutral" effect, and achievement of a VQO higher than that specified would result in a "beneficial" effect.

3 AFFECTED ENVIRONMENT

3.1 SCENIC RESOURCE MANAGEMENT

The LRMP and associated FEIS provide the primary direction for management of scenic resources on the project site. The LRMP designates the existing quarry as C1 Timber Emphasis and the surrounding landscape as B2 Scenic Viewshed, specifically, the Timberline Lodge Viewshed with the viewer position being the lodge and the background extending to approximately twelve miles (FS 1990). The C1 designation applies to areas currently screened from Timberline Lodge by the existing landform (Figure 3). Both of the proposed Action Alternatives would remove portions of the landform and expose C1 areas to view from the lodge. Therefore, for the purposes of this study, the areas that would become visible through the proposed Action Alternatives will be considered part of the B2 Scenic Viewshed.

VQOs are established in the LRMP and describe the degree of acceptable alteration to the landscape in terms of visual contrast with the surrounding landscape within Distance Zones from selected viewer positions (FS 1990).

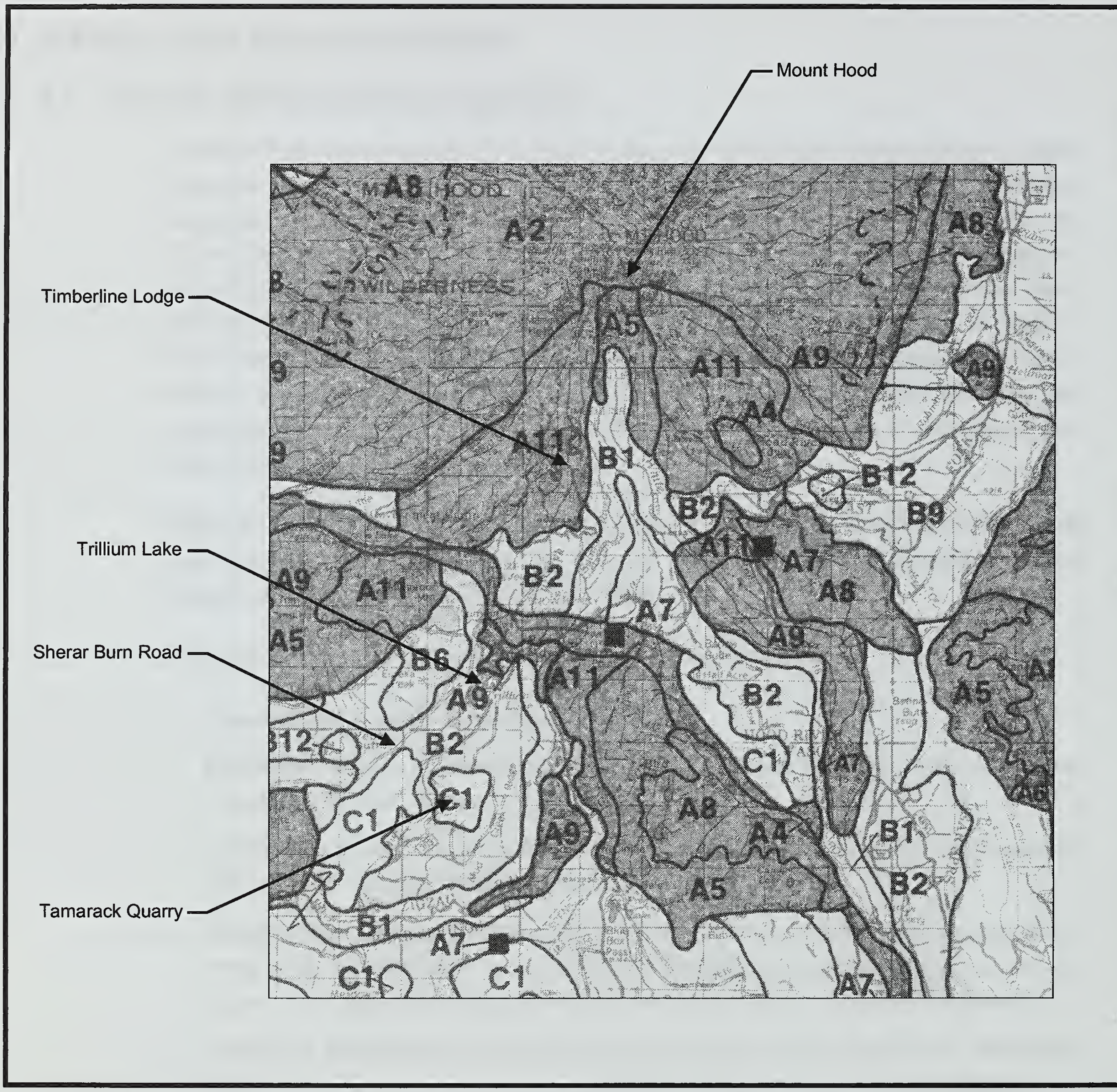
The FEIS identifies five VQOs, which are defined as (FS 1990a):

- **Preservation**: Limited to ecological changes.
- **Retention**: Retains a predominantly natural landscape. Human activities are not evident to casual observers.
- **Partial Retention**: Evidence of human activities is permissible, but is subordinate to characteristics of the natural landscape.
- **Modification**: Human activities may dominate the landscape, but their evidence must blend with the landscape's natural characteristics. Human modifications should appear to be natural occurrences when viewed from a close or moderate distance.
- **Maximum Modification**: Although human activities may dominate the landscape, they must still appear to be natural occurrences when viewed from long distances.

There are three Distance Zones, which are defined in Table 3-1.

Table 3-1. Distance Zone Definitions

Distance Zone	Viewing Distance
Foreground	Up to 0.5 miles
Middleground	0.5 to 5 miles
Background	Beyond 5 miles



Source: USDA , 1990a

Figure 3
LRMP Management Area Designations

Management activities must be consistent with the prescribed VQO for the viewshed shown in Table 3-2.

Table 3-2. Timberline Lodge Viewshed Visual Quality Objectives

Distance Zone	Visual Quality Objective
Foreground	Retention
Middleground	Partial Retention
Background	Partial Retention

Desired future conditions have been established in the LRMP. Given the key viewing area of Timberline Lodge (see Section 3.2.1) which is located approximately 5.7 miles north of the quarry, the Middleground and Background objectives of Partial Retention apply to the management intensity for the project. Timberline Lodge is approximately 5.7 miles north of the project area. The LRMP provides specific direction for these objectives:

- Natural appearing forest landscape, with little evidence of human alteration
- Dominant visual impression is mostly continuous tree canopies, with diversity in occasional natural appearing openings
- Mosaic of species and age classes add texture and color contrast in natural patterns
- Management activities repeat form, line, color and texture common to the characteristic landscape

3.2 LANDSCAPE SETTING

Recreational activities abound in the Mt. Hood National Forest with nearby trails, roads, rivers, lakes, campgrounds, and ski areas. Highways 26 and 35 serve as the major access corridors to the area; numerous FS roads provide a well-used network throughout the project vicinity. The site is approximately 1.5 miles south of Trillium Lake, which receives significant, year-round recreation. The approximate elevation of the project area is 3,800 feet above mean sea level. Historically, the Salmon River Watershed has been used by American Indians as a major huckleberry picking area, particularly in the Sherar Burn, Mud Creek, and High Rock areas (FS 1995). The Sherar Burn area (an area burned by wildfire approximately 70 years ago) is still used by American Indians for huckleberry picking and bear grass harvesting, and by recreation users for berry picking. There are no mature trees to screen the view of the quarry from the Sherar Burn.

The project is in an area of high visual quality importance, dominated with mature Douglas fir (*Pseudotsuga menziesii*) forest. Snow-capped peaks of Mt. Hood, Mt. Jefferson, and ridgelines in the Cascade Range augment the area's scenic quality. Timber harvest activities have resulted in an unnatural patchwork pattern in several areas and

create strong visual contrast when viewed from Timberline Lodge. Trillium Lake, also viewed from Timberline Lodge, creates a distinct, natural appearing contrast amid the surrounding forested landscape.

Climatic conditions vary dramatically and affect the visual environment. The vicinity receives a significant amount of rain and snow annually. Fog and low clouds are common and block views beyond the foreground. Haze and smoke may also affect the seen environment depending on local conditions. During exceptionally clear winter weather, snow glare may affect the views in the foreground and exacerbate contrast in the middle and background.

3.2.1 Key Viewing Areas

Conversations with FS staff, a review of relevant and available mapping, visitor use information, limited GIS spatial analyses, and public comment led to the conclusion that Timberline Lodge is the only key viewing area for this project (Tierney, pers. comm. 2003, Walker, pers. comm. 2003). Therefore, the following discussions on landform and waterform, effects, and impacts are presented in the context of being viewed from Timberline Lodge. Furthermore, depending on one's specific viewpoint from the Lodge, the proposed activity is screened from view by vegetation and landform.

The key viewing area for the analysis is from the "picture window" on the second floor of the main entrance to Timberline Lodge.

The campground and dam at Trillium Lake are also considered important viewing areas, as are Sherar Burn Road and the Salmon River corridor. Therefore, limited analysis was conducted to determine potential visual impacts of the project from those areas.

3.2.2 Landform

The surrounding landform is mountainous and bold, typical of the Cascade Range. The jagged peak of Mt. Jefferson and distant ridges to the south are silhouetted against the skyline as shown on Figures 4 and 5. As viewed from Timberline Lodge, the foreground features strong, interesting contrast in form, line, color, and texture created by the juxtaposition of mature forest canopy, snags, ski runs, the slopes of Mt. Hood, talus, the horizon line, and middleground/background imagery. Structures associated with the lodge, such as buildings, ski lifts, utilities, and other hardscape elements, are part of the existing landscape character.

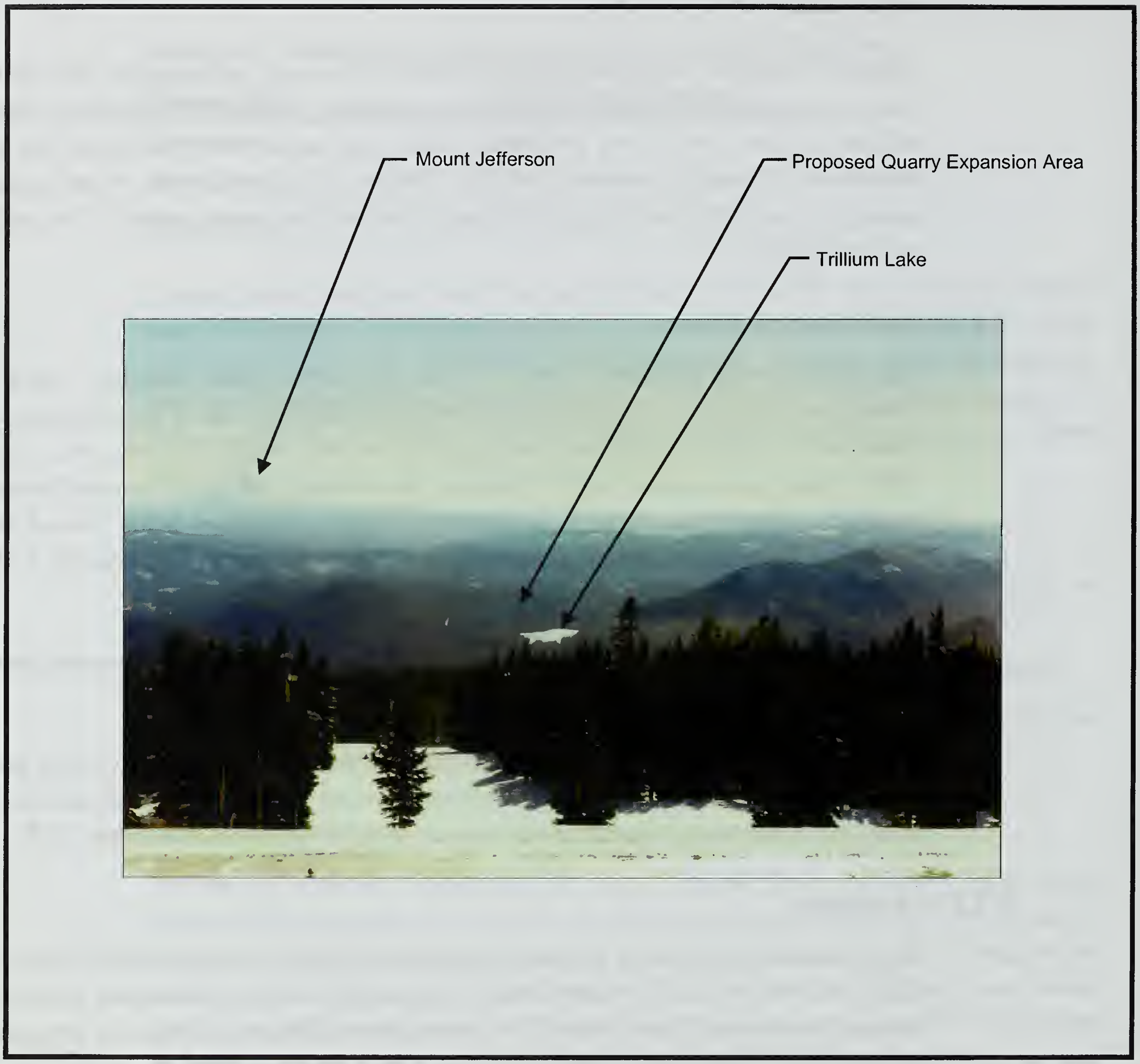


Figure 4
Existing Conditions: View from Timberline Lodge in Winter

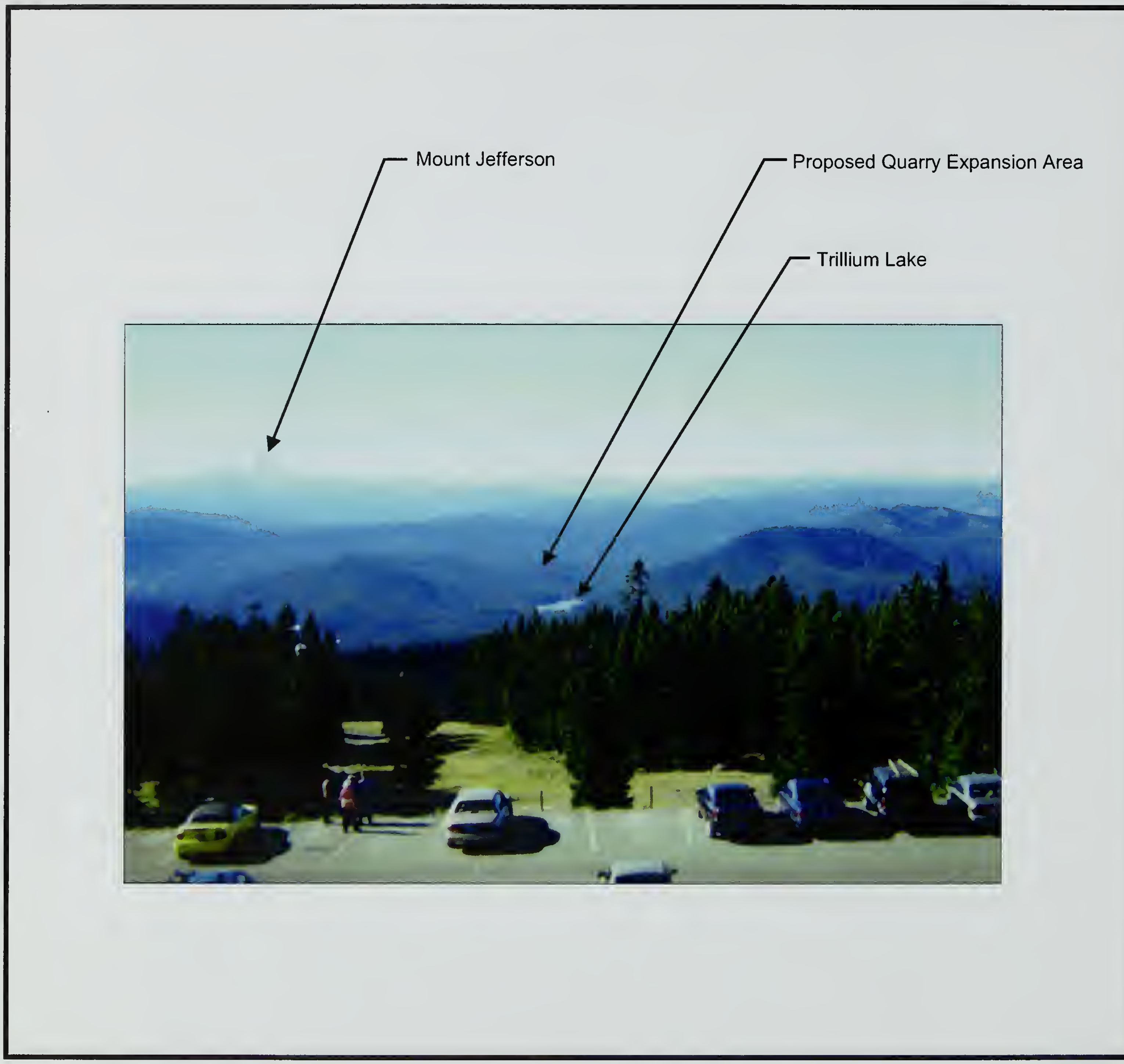


Figure 5
Existing Condition: View from Timberline Lodge in Summer

The project area, viewed from the lodge, is approximately 5.7 miles to the south. The existing quarry is tucked behind a ridgeline and is not visible. A small, forested knoll north of the quarry has the potential to screen or partially screen the proposed expansion from view. Undulating horizontal bands of color, shadow, and texture create visual interest in the middleground and background as forested slopes fade into the distance. Colors fade from dark green to blue and gray depending on light conditions. Several prominent buttes and ridgelines dominate the middleground. Previous timber harvest practices have resulted in an unnatural-appearing patchwork plainly visible from the lodge. A short section of FS road 2656 is visible east of Trillium Lake during winter conditions and appears as a natural scar on the landscape. Mt. Jefferson's silhouette on the horizon creates a focal point in the distant background.

3.2.3 Waterform

Trillium Lake is the only water body visible from the key viewpoint and creates strong, natural appearing contrast in color and texture against the dark green forest canopy. The lake also provides a middleground focal point throughout the year.

4 ENVIRONMENTAL CONSEQUENCES

This section addresses the effects of the proposed project on the scenic qualities of the project area and as seen from the key viewing area. The visual simulations presented in this section are of the view from the picture window at Timberline Lodge. When viewing the visual simulations included in this section, it is important to note that the simulations have been based on U.S. Geological Survey (USGS) 7.5-minute quadrangle contour lines and use the 10-meter grid DEMs provided by the FS. The simulations are intended to best represent future conditions for both action alternatives using the available information. The actual appearance of the quarry upon completion of expansion may vary from the visual simulations.

4.1 ALTERNATIVE 1

Visual simulations from Timberline Lodge of Alternative 1 in winter and summer conditions are shown on Figures 6 and 7, respectively. They depict two visible areas of the expanded quarry. The simulations present a worst-case scenario in that they show the expansion at its maximum limits, with no revegetation, even though the reclamation plan likely would require the importation of topsoil and revegetation of the site. The photograph used in the winter simulation was intentionally taken on a clear winter day to intensify the potential contrast in color between the snowy white quarry openings and the surrounding forest canopy.

When compared against the existing landscape character, Alternative 1 would result in low contrast in form and line, and low contrast in texture. Color contrast would be high in winter and moderate in summer. The form, line, and texture of the proposed expansion would be generally consistent with other openings in the viewshed. Although contrast in

color would be high, the openings would mimic the appearance of Trillium Lake in winter conditions. Contrasts in color would likely become negligible as the reclamation plan to establish vegetation is successfully executed. Reclamation could occur in stages, so that portions of the quarry would be revegetated as the rock source is exhausted.

Under Alternative 1 (as with Alternative 2), detailed excavation and reclamation plans would be developed, approved by the FS, and implemented as expansion occurs. Overburden soil has been and would continue to be saved for use during later reclamation of the quarry. The soil would be pushed back into the quarry benches and floors and planted with erosion-preventing, native grasses and other vegetation when the excavation is completed. Portions of the quarry could be reclaimed in stages, depending on the final quarry reclamation plan.

Given the distance of approximately 5.7 miles from Timberline Lodge to the quarry, it is not likely that batching and stockpiling operations or equipment could be observed with the naked eye. Ample opportunity exists at the quarry to keep batch facilities and stockpiles screened from view using topography. The haul route is not visible from the lodge, so no effect is anticipated from additional traffic along the haul route.

Dust from rock extraction, crushing, screening, batching, loading, and hauling would cause localized air quality impacts to the Trillium Lake basin area. FS road 2656 is paved. The amount of dust created would be minimized by sprinkling when necessary, so dust would not create significant adverse visual impacts. The distance from the lodge to the quarry further reduces the likelihood of visual impacts from dust. It is highly unlikely that exhaust from equipment would cause a plume that would be visible from Timberline Lodge, as typically exhaust plumes do not appear unless there is a large concentration (more than 20) of heavy vehicles that are idling simultaneously in one location (Moore, M., pers. comm., 2004). ODOT would have fewer than a half-dozen vehicles operating at any one time.

In the short term, Alternative 1 would not directly affect the scenic environment because it would be approximately 10 to 15 years before the quarry expansion would daylight into the knoll and sideslopes that currently screen the quarry from the lodge. Long-term effects to the scenic environment, when compared to the existing landscape character, would be consistent with the VQO of Partial Retention (evidence of human activities is permissible, but is subordinate to characteristics of the natural landscape). Even though the quarry expansion area would be partially visible, it would be subordinate to the characteristics of the natural landscape.

The expanded quarry would not be visible from Trillium Lake, the campground, or the dam—or the Salmon River corridor. Vegetation and topography would screen views of the quarry from these areas.

Figure 6
Visual Simulation of Alternative 1 in Winter

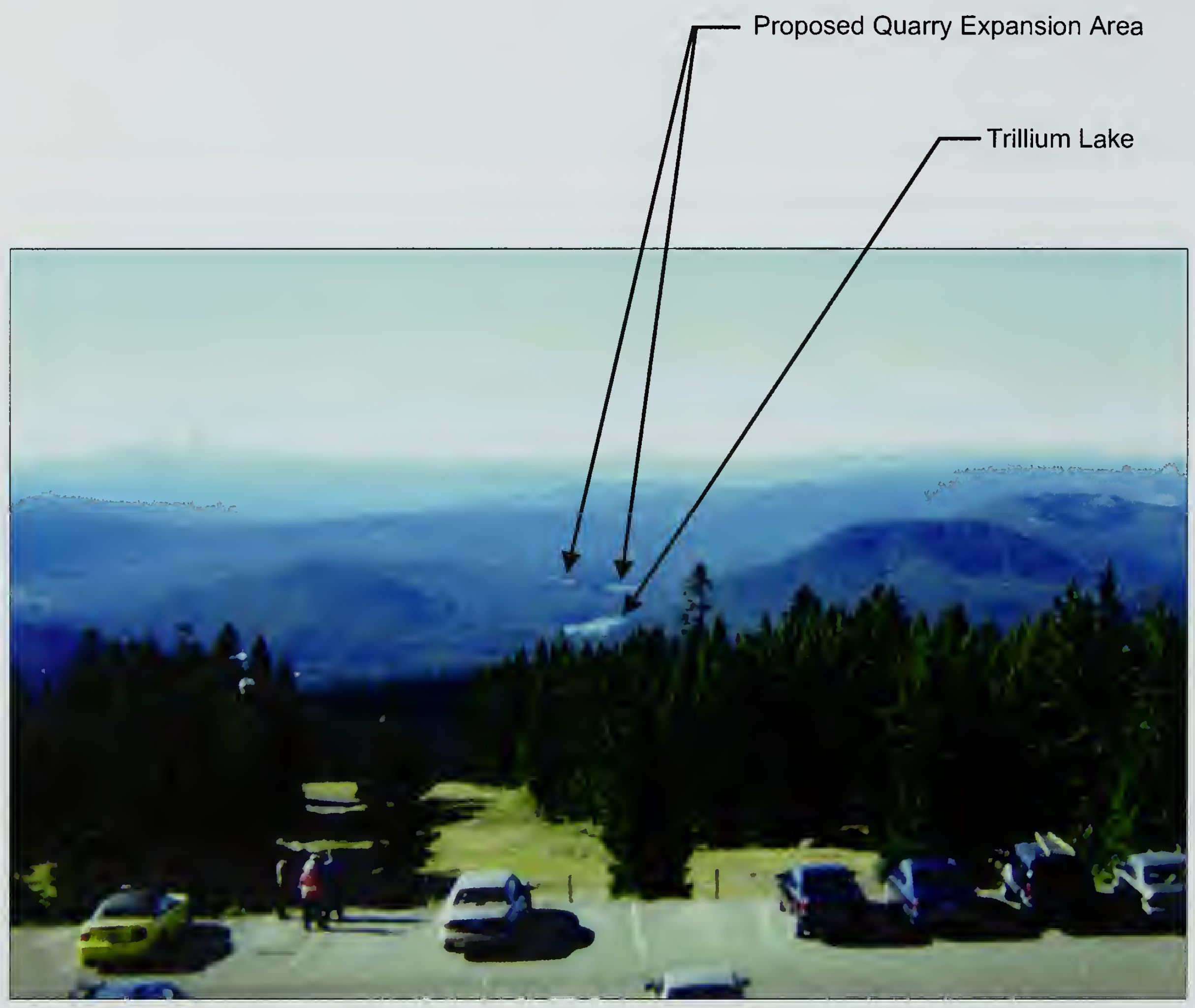


Figure 7
Visual Simulation of Alternative 1 in Summer

The existing quarry is visible from the Sherar Burn huckleberry and bear grass harvesting area, and the proposed expansion would create more of a visual impact to users' experience. Due to the lack of trees in the Sherar Burn area and the topography between that area and the quarry, views of the quarry from Sherar Burn could not be screened. As reclamation of the quarry is implemented, visual impacts would be reduced. Sherar Burn is not a key viewing area.

4.2 ALTERNATIVE 2

Visual simulations from Timberline Lodge of Alternative 2 in winter and summer conditions are shown on Figure 8 and Figure 9, respectively. They depict two small areas of the expanded quarry that appear as horizontal slivers on the landscape. Similar to Alternative 1, the winter simulation also presents a worst-case scenario in that it shows the expansion with no revegetation and in bright, winter conditions.

While the simulation indicates that small portions of the expansion would be visible, the level of detail in the 10-meter DEM and USGS contour information used to model the simulations makes it very difficult to determine the exact line at which the expansion would become visible. The resolution of the available information is not high enough to enable an exact determination, but it does provide a good estimate of where that line might occur. Because the intent of Alternative 2 is to expand the quarry to a point just before it would become visible from the key viewing area (Timberline Lodge), monitoring the expansion to determine visibility from the lodge is discussed as a mitigation measure in Section 5.

For the purposes of this study, the visual impact analysis for Alternative 2 is based on the simulations in Figure 8 and Figure 9. It is anticipated that the actual impacts would be less than shown in the simulations because the expansion would be monitored and revised so as not to be visible from Timberline Lodge.

When compared to the existing landscape character, Alternative 2 would result in low contrast in form and line, moderate to low contrast in color, and low contrast in texture. The form, line, and texture of the proposed expansion would be generally less obtrusive than other openings in the viewshed. The contrast in color would be moderate to low because the extent of the impact would be relatively small when compared to other openings such as Trillium Lake and clearcuts. Although the visible clearcuts were harvested 10 to 20 years ago, they have been slow to revegetate and still present a contrast in color. In winter conditions, the quarry openings would also be similar in appearance to Trillium Lake. Contrasts in color would likely become negligible as the reclamation plan to establish vegetation is successfully executed. Reclamation could occur in stages, so that portions of the quarry would be revegetated as the rock source is exhausted.

Given the distance of approximately 5.7 miles from Timberline Lodge to the quarry, and the fact that most of the landform screening the expansion would be left in place, it is unlikely that batching and stockpiling operations or equipment would be visible. The proposed haul route is not visible from the lodge, so no effect is anticipated from additional traffic along the haul route.

Based on the simulation, the proposed action would not directly affect the scenic environment in the short term because it would be approximately 10 to 15 years before expansion activities breached the area visible from Timberline Lodge. Long-term effects to the scenic environment, when compared to the landscape character in 10 to 20 years, would be minor, if not negligible.

In summary, based on the visual simulations, Alternative 2 would meet the VQO of Partial Retention (evidence of human activities is permissible, but is subordinate to characteristics of the natural landscape) and would be less visible than Alternative 1. Furthermore, if recommended mitigation measures to monitor and revise the expansion area are implemented, the quarry would not be visible from Timberline Lodge.

The existing quarry is visible from the Sherar Burn huckleberry and bear grass harvesting area, and the proposed expansion would create more of a visual impact to users' experience, although less of an impact than Alternative 1. Due to the lack of trees in the Sherar Burn area and the topography between that area and the quarry, views of the quarry from Sherar Burn could not be screened. As quarry reclamation is implemented, visual impacts would be reduced. Sherar Burn is not a key viewing area.

As with Alternative 1, the expanded quarry would not be visible from Trillium Lake, the campground, or the dam, or the Salmon River corridor, because vegetation and topography would screen the quarry from view.

4.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the FS would expand the quarry from its current size of approximately 22 acres to the existing permitted boundary of approximately 29 acres. Blasting, crushing, screening, batching, and loading would occur as with Alternatives 1 and 2. Based on the available information and modeling, the expansion area would not encroach far enough into the knoll and sideslopes for the No Action Alternative to be visible from Timberline Lodge. Therefore, the No Action Alternative would meet the VQO of Partial Retention and have a neutral effect.

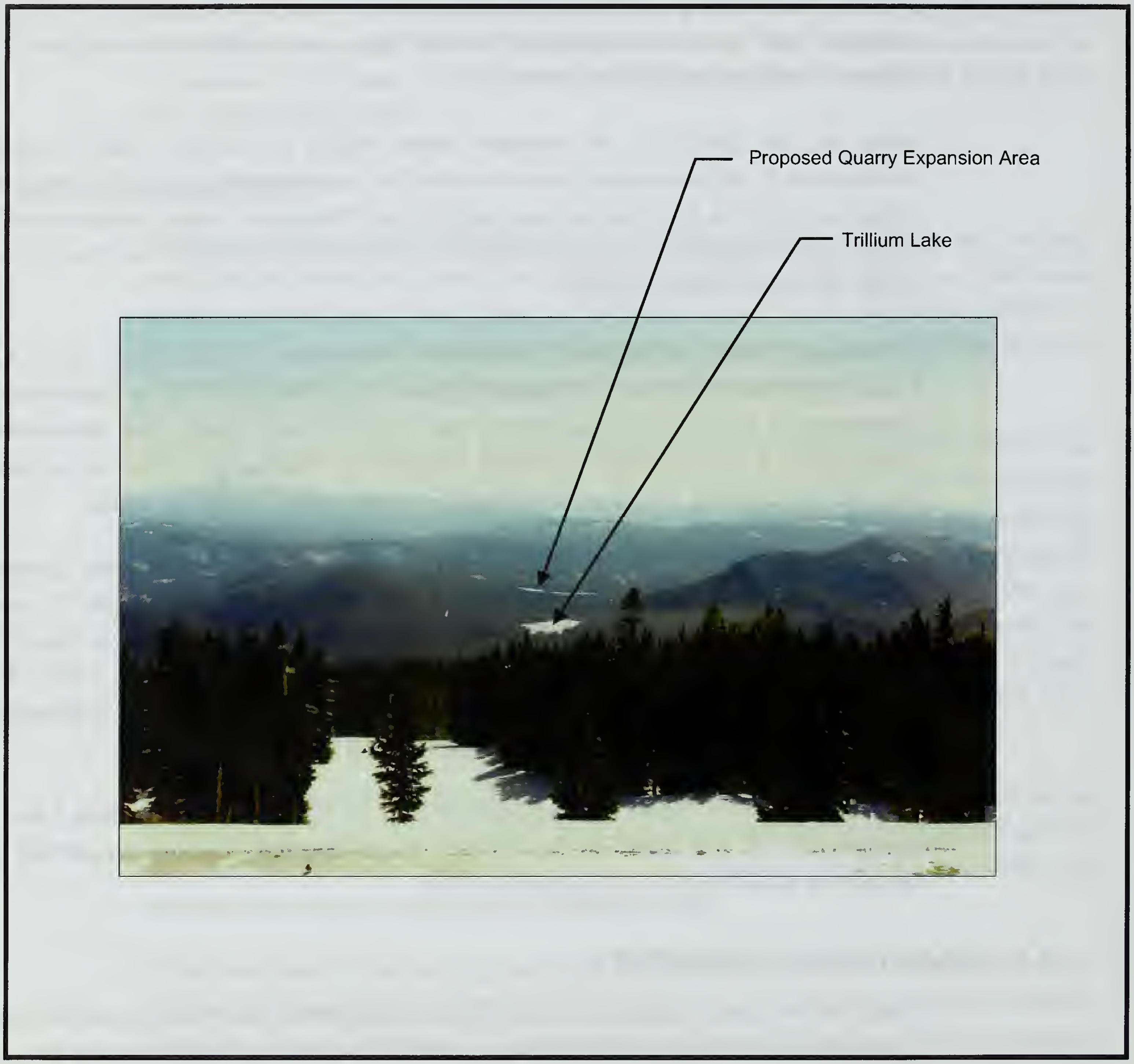


Figure 8
Visual Simulation of Alternative 2 in Winter

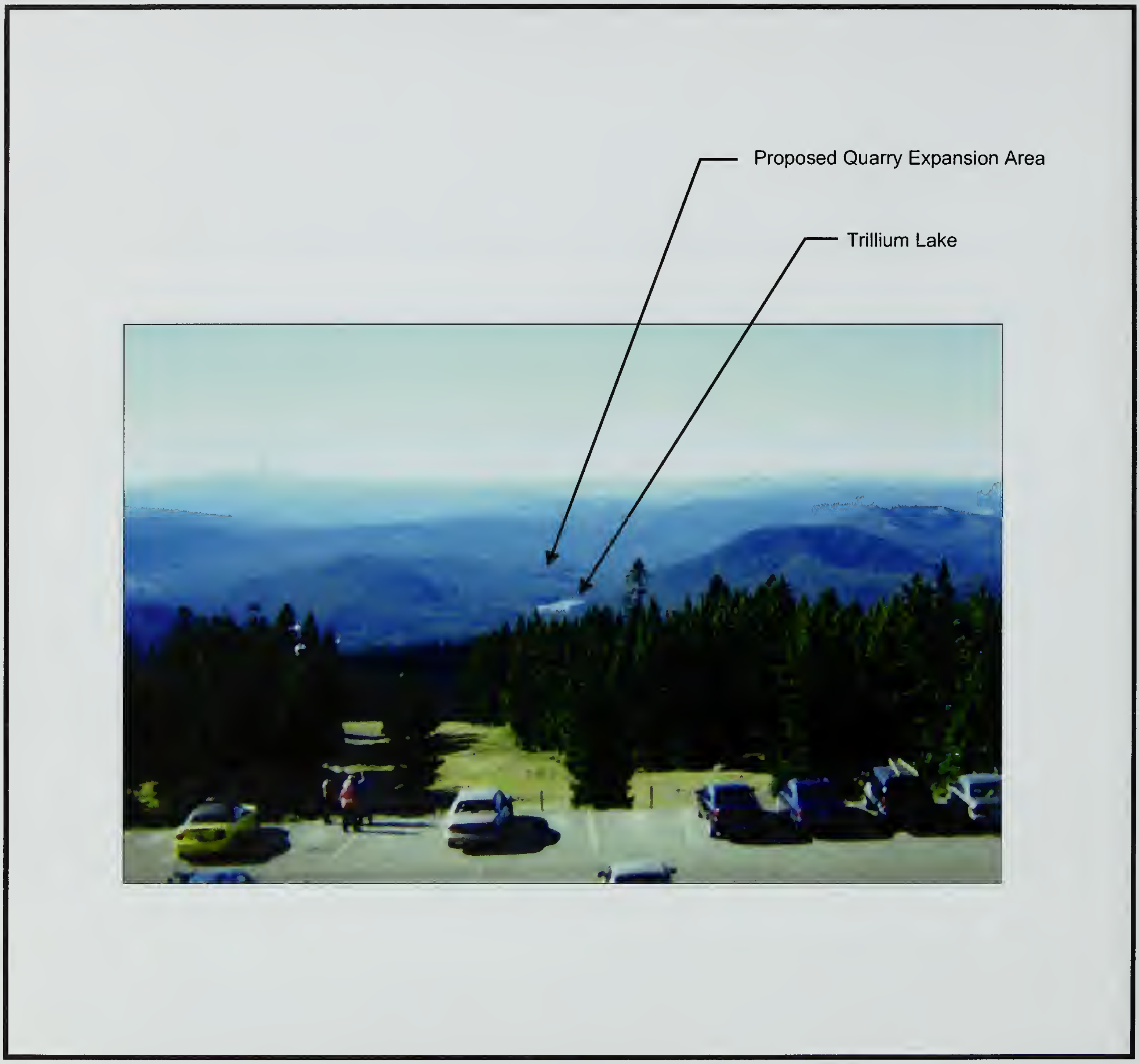


Figure 9
Visual Simulation of Alternative 2 in Summer

As noted above, the existing quarry is visible from the Sherar Burn area, and the expansion that would occur under the No Action Alternative would increase visual impacts to users' experience. However, the impacts would be much less than under the Action Alternatives. Views of the quarry from Sherar Burn cannot be screened, but as quarry reclamation is implemented, visual impacts would be reduced. Sherar Burn is not a key viewing area.

The quarry would not be visible from the Salmon River corridor, or from Trillium Lake and its associated campground and dam because of topography and vegetation.

4.4 CUMULATIVE IMPACTS

Other known projects planned in the project vicinity include the Salmonberry #5 commercial thinning project, the Timberline Express Lift, the Timberline fuels reduction project, and trail development in accordance with the Government Camp Trails Master Plan for the Mt Hood area. None of these projects are in the immediate vicinity of the quarry. No other new quarry operations are proposed in the Mt. Hood National Forest.

Of the projects listed above, only trail development is expected to occur the viewshed seen from Timberline Lodge. Due to their nature and their distance from the lodge, the trails would not be visible from the lodge. Therefore, there would be no cumulative effects. However, if logging, road improvements, or other clearing activities occur within the viewshed, the cumulative impacts may exceed the VQO of Partial Retention. Additional studies would be required to assess impacts resulting from potential future projects. Given the relatively minor impacts resulting from the proposed action alternatives, it is not likely that the quarry expansion would contribute significantly to cumulative impacts.

5 POTENTIAL MITIGATION MEASURES

Although both proposed Action Alternatives would meet the VQO of Partial Retention, the following mitigation measures could be implemented to mitigate and/or reduce potential impacts to the scenic environment.

1. Monitor expansion from Timberline Lodge to determine when impacts are becoming visible. The expansion project would take an extended period of time and would be accomplished in phases. Monitoring the success of reclamation efforts would help determine actual visual impacts by showing if reclaimed areas have a natural appearance before new areas are opened and become visible from Timberline Lodge. Monitoring the actual expansion footprint from the lodge would help determine where the limits of visibility occur.

2. Locate processing equipment and batching facilities on the lower levels of the quarry. Existing topography and vegetation could screen equipment and facilities placed on the quarry floor from view.

3. Augment forest cover on the north side of the expansion area. Supplementing existing vegetation with additional plantings would, in time, provide a screen for portions of the expansion area. The area would be planted when specific quarry development plans are proposed for the northernmost portion of the expansion area. Planting plans would be coordinated with a FS wildlife biologist to meet wildlife goals for the area.

6 ENVIRONMENTAL CONSULTATION, REVIEW AND PERMIT REQUIREMENTS

This study follows the protocol for assessing visual impacts as outlined in the Visual Management System (VMS) (FS 1974). The proposed actions meet the VQO of Partial Retention as stated in the LRMP. Therefore, no additional consultation is required. No known permits are required for potentially impacting visual resources.

7 INDIVIDUALS AND AGENCIES CONSULTED

Jim Tierney, USFS, January 10, 2003, project meeting

Mike Redmond, USFS, January 10, 2003, project meeting

Charlie Scisione, ODOT, January 10, 2003, project meeting

Kevin Bracy, ODOT, January 10, 2003, project meeting

Jim McNamee, ODOT, January 10, 2003, project meeting

8 LIST OF PREPARERS

Sean Sullivan, L.A. is the principal author of this report. Kristina Gifford McKenzie provided quality review. Tannen Printz performed the visual simulations; Aaron Turecek performed the seen area analysis. Sharon Johnson provided word processing.

9 REFERENCES CITED

USDA Forest Service (FS). 1974 *National Forest Landscape Management*, Volume 2, Chapter 1: The Visual Management System, Agriculture Handbook 462.

____. Mt. Hood National Forest. 1987 (April). "Mt. Hood National Forest Rock Resource Plan."

____. 1990. *Land and Resource Management Plan for the Mt. Hood National Forest*

____. 1990a. Final Environmental Impact Statement for the Land and Resource Management Plan, Mt. Hood National Forest.

____. 1995. "Salmon River Watershed Analysis."

9.1 PERSONAL COMMUNICATIONS

Barnhart, William, Assistant District Manager , Oregon Department of Transportation. Electronic mail sent to Kristina McKenzie, DEA. June 19 and 24, 2003.

Moore, Martha, Principal, TW Environmental, Inc. Telephone conversations. January 27 and February 3, 2004.

Walker, Kathleen, Recreation Assistant, Zigzag Ranger District, US Forest Service, Mt. Hood National Forest. Electronic mail communication. September 16, 2003. Sent to James Tierney, Infrastructure Team Leader, Clackamas River Ranger District, US Forest Service, Mt. Hood National Forest.

Appendix B: Soil and Water Technical Report

(No changes between Draft and Final EIS)

Soil and Water Resources Technical Memorandum

Tamarack Quarry Expansion Environmental Impact Statement

for

USDA Forest Service
Mt. Hood National Forest

March 2004

Table of Contents

LIST OF FIGURES

GLOSSARY

Accelerated erosion	Rates of erosion that are much greater than normal, natural rates; primarily as a result of some disturbance, often human induced.
Alluvium	Material transported and deposited by a stream or river, usually a coarse deposit composed of sand and rock.
Available runoff	Total precipitation less evapotranspiration and infiltration. The amount of water not lost to infiltration into the soil, or uptake and transpiration by plants, or evaporation.
Catchment	A 7th field hydrologic unit or drainage nested within a larger 6th field subwatershed. For example, the Mud Creek catchment is one of the smaller drainages that comprise the larger West and East Forks of the Salmon River 6th field subwatershed.
Disturbance regime	Natural pattern of periodic disturbances, such as fire or flood, followed by a period of recovery from the disturbance, such as regrowth of a forest after fire.
Effective ground cover	A continuous cover of organic material, such as plants or plant residues, like litter or duff, that protects soil materials from erosional forces.
Ephemeral stream	A stream, or stream segment that only flows seasonally during most years. Stream flow that only lasts for a brief period during a water year, the remainder of the year it is absent.
Glacial till	Unstratified glacial drift deposited directly by ice and consisting of clay, sand, gravel, and boulders intermingled in any proportion.
Gully/rill erosion	The dislodgement of soil particles by a concentrated flow of water.
Igneous rock	Rock that has formed by the cooling and consolidation of viscous rock, or magma.
Intermittent stream	A stream that flows only at certain times of the year when it receives water from other streams or from surface sources such as melting snow.
Mass wasting	The dislodgment and downhill transport of soil and rock materials under the influence of gravity. Many classifications of mass movement are identified, including soil creep, debris slides, rotational slides or slumps, and rock slides.
Seep	A site where groundwater is present at the surface.
Soil creep	The slow, downslope movement of weathered rock fragments and soil.
Stream order	The hierarchical ordering of streams based on the degree of branching. A first-order stream is an unforked or unbranched stream. Two first-order streams flow together to form a second-order stream, two second-order streams flow together to form a third-order stream, and so on.

Subwatershed	A 6th field hydrologic unit or drainage nested within a larger, 5th field hydrologic unit known as a watershed. For example: The West and East Forks of the Salmon River is just one of many 6th field hydrologic units or subwatersheds that comprise the larger Salmon River Watershed.
Surface erosion	Wearing away of the earth's surface by water, ice, wind, or other natural agents under natural environmental conditions of climate, vegetation, and landscape, undisturbed by human influences.
Watershed	The region draining a river, river system, or body of water.

1 INTRODUCTION

Interpretations and descriptions contained in this memorandum rely heavily on local information derived from the Mt. Hood Soil Resource Inventory (Howes 1979) and the Salmon River Watershed Analysis (USFS 1995). These sources were used along with topographic maps and aerial photographs of the project area, field notes, meetings with agency specialists, and various other related reports and directives to characterize local conditions and support analysis conducted for predicting environmental consequences of the proposed actions.

The project area that this memorandum addresses includes the main Tamarack Quarry site and proposed expansion area, as well as the primary haul route (Forest Roads 2656 and 2656-955) connecting the site with U.S. Highway 26. Figure 1 shows the project vicinity, and Figure 2 shows the existing quarry and proposed expansion areas for the alternatives under consideration. For a description of the project area, see Chapter 1 of the Draft Environmental Impact Statement (DEIS). Actions addressed here include those associated with the proposed expansion of the quarry site. Additionally, operational actions such as blasting, rock crushing, and material hauling are considered.

2 AFFECTED ENVIRONMENT

2.1 RELIEF

The project area lies within the High Cascade Physiographic Province described by Franklin and Dyrness (1969). Locally, landforms where the project area is located, such as Mud Creek Ridge, the Mud Creek valley, and Summit Meadows, are typical of features associated with the High Cascade Province. Mud Creek Ridge is typified by rolling mountainous terrain of modest elevation (less than 5,000 feet). Its side slopes are moderately steep to steep, and primarily uniform (or in places concave) in shape. The valley of Mud Creek is U-shaped, and along with Summit Meadows is about one-quarter to one-half mile wide. Valley relief is primarily gentle and slopes are mild. The quarry site is located on the lower third of the western side of Mud Creek Ridge, while the haul route leads from there down to the valley bottom, then past Summit Meadows and up to the base of Mt. Hood at U.S. Highway 26. Slopes around the quarry site naturally range between about 20 and 50 percent, while those directly at the quarry range from nearly level to very steep, in places being nearly vertical. In comparison, slopes crossed by the haul route usually do not exceed 30 percent.

2.2 WATERSHEDS AND STREAMS

The project area lies mostly within the 4,394-acre 7th field hydrologic unit identified as the Mud Creek catchment. A much smaller portion of the project area is within the 6th field hydrologic unit identified as the West and East Forks of the Salmon River subwatershed. Both of these hydrologic units are contained within the upper portion of

the 73,240-acre 5th field watershed of the Salmon River, a tributary to the Sandy River, which flows into the Columbia River (USFS 1995).

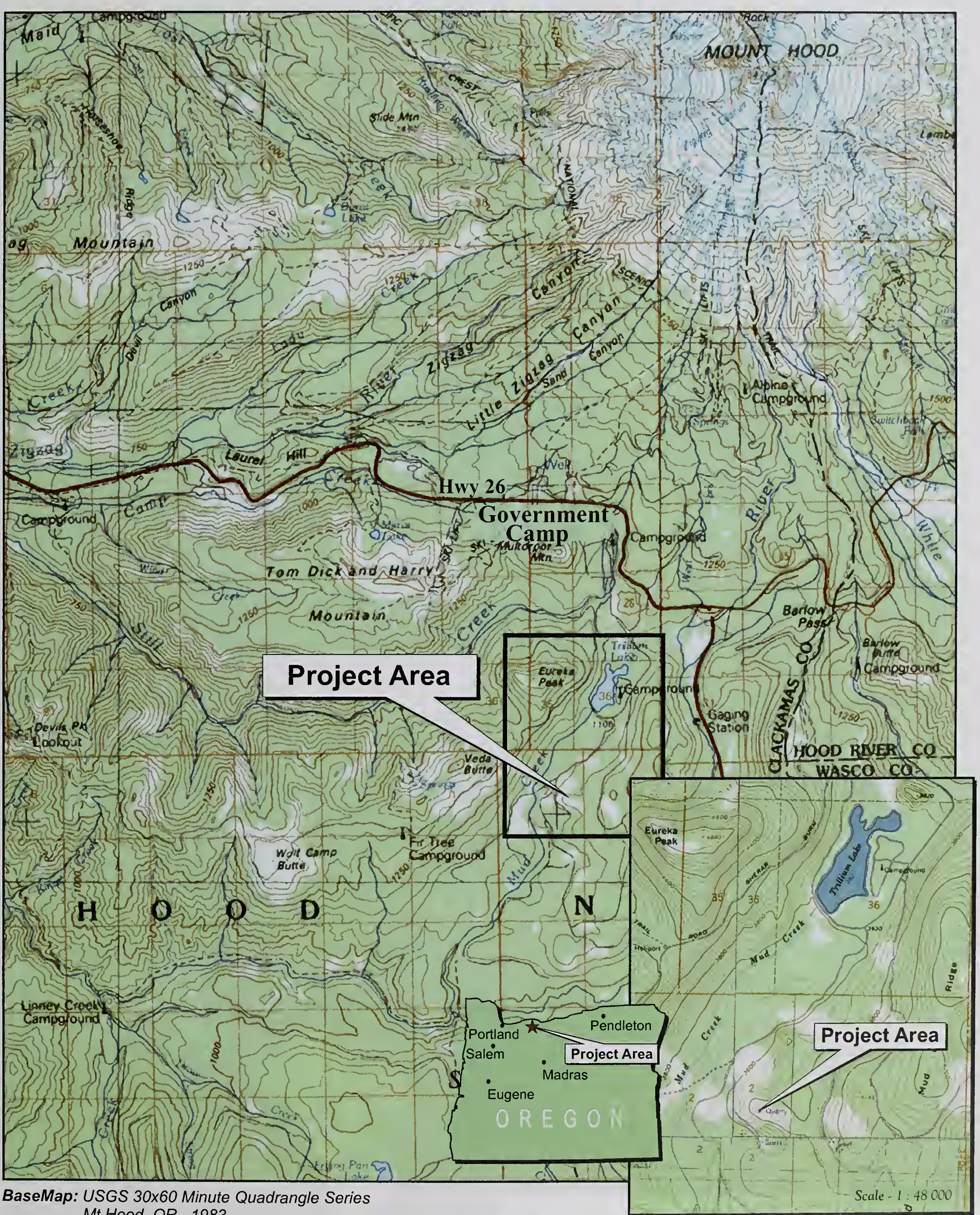
Two perennial streams are near the project area and haul route. The first is Mud Creek, the only named stream near the project site, which issues from Trillium Lake. The other is an unnamed stream originating from Summit Meadows. Both are headwater tributaries to the Salmon River. Additionally, there are a number of small, unnamed, seasonally flowing, intermittent streams that originate from the west slope of Mud Creek Ridge and are tributary to Mud Creek or Trillium Lake. Most cross beneath the haul route, though one in particular is very near to the southern bounds of the quarry site.

Mud Creek is a small, perennially flowing, somewhat confined, gently meandering, second-order stream that issues from Trillium Lake reservoir. Its mid- and upper reaches parallel portions of the haul route. Although both the lake and creek are nearby, they are not directly adjacent to or in contact with either the quarry site or the haul route. The shortest distance between the quarry site and Mud Creek is roughly 0.4 mile. Reaches of Mud Creek that parallel the haul route have low, indistinct stream banks thickly covered by aquatic grasses, brush, and woody debris. The channel is about three to four feet wide, and mostly a low- to moderate-gradient, riffle-pool type of stream sequence.

The unnamed perennial stream originates from Summit Meadows and crosses beneath the haul route near where it intersects with Forest Road 2656-131, about one-half mile south of U.S. Highway 26. Its features are very similar to those of Mud Creek, and it is associated with an adjacent wetland corridor that connects to a complex of wetlands known as Red Top and Salmon River Meadows downstream.

Between the Trillium Lake Campground and the quarry site are about ten very small, first-order ephemeral streams that cross beneath the haul route. Their hillslope sources are small springs and seeps replenished by snowmelt-charged groundwater and runoff. In the spring and early summer they are freshets that are dry by mid- to late summer. Their lower reaches are moderate- to high-gradient, cascading step/pool stream types. However, much of their upper reaches are overgrown and indistinct, with an intermittent and discontinuous channel, and predominantly subsurface flow. Evidence of annual surface scour in the upper reaches of these small streams is often lacking.

One of these very small streams is in close proximity to the quarry site. It originates about 250 feet south of the lower pit of the quarry from a small, seasonally ponded seep in a broad shallow swale. The upper reaches are mostly subsurface flow, interspersed periodically with small, pools and wallows that dry up in the summer. These features are disconnected on the surface, and lack a continuous channel between them. About one-eighth mile downhill, this water source emerges to the surface as a continuous feature just above where it flows beneath Forest Road 2656. It then flows to Mud Creek in a shallow; 2- to 3-foot-wide, indistinct channel lined with dense forest vegetation and filled with an abundance of downed woody debris.

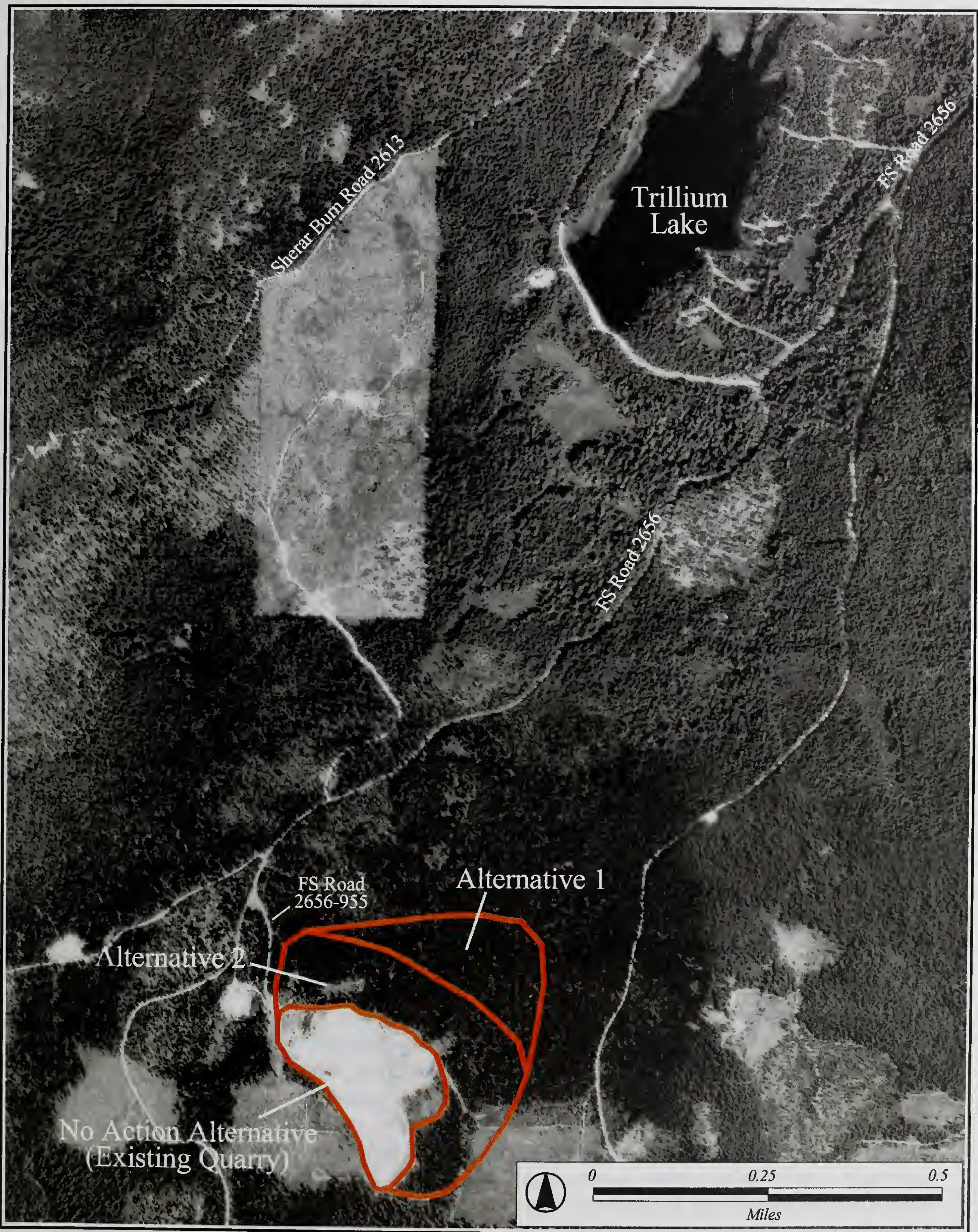


BaseMap: *USGS 30x60 Minute Quadrangle Series*
Mt Hood, OR 1983

Inset Map: *USGS 7.5 Minute Quadrangle Series*
Mt Hood South, OR 1980; Government Camp, OR 1980;
Wolf Peak, OR 1985; Wapinitia Pass, OR 1985

Figure 1
Vicinity

Scale - 1 : 100 000



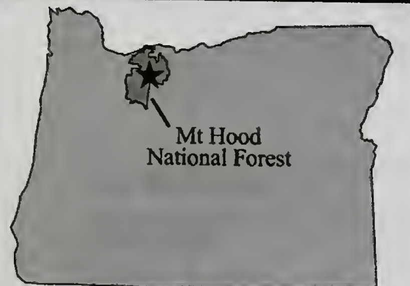


Figure 2
Alternatives Under Consideration

2.3 STREAMFLOW AND THE HYDROLOGIC REGIME

The Salmon River Watershed Analysis indicates that average precipitation in the Mud Creek catchment ranges between about 65 and 70 inches annually (USFS 1995). The greatest amount falls in the period between November and January, and the least amount in July and August. During most years a winter snowpack accumulates in the drainage, providing water storage over the winter and supplementing surface flow and groundwater recharge in the spring and summer (USFS 1995).

The hydrologic regime of the upper Salmon River, including the 7th-field Mud Creek catchment, is a snow- and rain-dominated system. Flows are usually lowest in the late summer and fall, then they typically increase in late fall and stay steady through the wet winter months until early spring. In spring, flows steadily rise again and peak during periods of high snowmelt, then they gradually diminish in late spring and early summer as the snowpack melts (USFS 1995).

Typically, normal peak flows are associated with the spring runoff. However, large magnitude runoff or flood events often result when periodic rain-on-snow events occur, usually during the wet winter months. The project area is within the upper range of the transient snow zone, where heavy intense rains can fall on accumulations of snow in the mountains. Such occurrences have resulted in the largest runoff and flood events recorded in the western Cascades (USFS 1995). In regions where episodes of rain-on-snow periodically occur, both natural and human disturbances can have a considerable effect on peak flows, increasing the susceptibility of a watershed to flood events (Harr et al. 1975).

In western Oregon, natural disturbances capable of denuding the forest canopy over a large area, such as wildfire, have been shown to hasten the timing and accentuate the magnitude of peak flows, particularly those resulting from high precipitation and rain-on-snow events. A portion of the western half of the Mud Creek catchment was burned in the early 1940s, and the forest canopy was mostly destroyed over a large area (USFS 1995).

The loss of the forest canopy would have diminished its moderating effects on interception of snow and rainfall, snow accumulation, snow melt, evapotranspiration, and runoff until a protective cover of vegetation returned. For a time, peak flows may have been elevated in Mud Creek as an indirect result of wildfire, leading to excessive stream bank erosion, channel scour, and downcutting. Unstable banks along the lower reaches of Mud Creek near its confluence with the Salmon River suggest that a considerable degree of stream erosion had occurred in the past, which could be attributable, in part, to elevated peak flows resulting from high intensity wildfire (USFS 1995). At present, however, effects to Mud Creek from past wildfire seem to have diminished greatly since the area has recovered, and a protective forest canopy has returned to the once burned over areas.

Human disturbance can also affect peak flows. Road surfaces and clearcut timber harvest can be primary disturbances that adversely affect the timing and magnitude of peak flows (Harr et al. 1975). As with natural disturbances, of particular concern are effects of human disturbance on peak flows generated by high precipitation and rain-on-snow events that can increase flooding potential. According to the Salmon River Watershed Analysis (USFS 1995), peak flows have been elevated in the Mud Creek catchment as a result of human disturbance, primarily attributable to the presence of roads. While past clearcut timber harvest and historic wildfire have been influences, their effect is thought to be diminishing as forest vegetation and a canopy continue to develop.

Base flows in the perennial stream reaches near the project area occur in late summer and fall, long after the contributing snow pack has diminished. In the Mud Creek catchment, groundwater recharged annually with snow melt maintains base flows. The nearly level wetlands on the north end of Trillium Lake and along Mud Creek retain groundwater later into the season than surrounding hillsides, and these wetlands provide available water that support summer flows. The Salmon River Watershed Analysis (1995) indicates that, for reasons that are uncertain, base flows (particularly in the upper portion of the watershed) have been slowly declining since the early 1950s. Climatic factors, human disturbance, or a combination of both may play a role, but the connection is unclear. The reservoir at Trillium Lake, however, stores water that can be available for release to maintain base flow in Mud Creek. Its influence serves to moderate variations in flow from year to year. Likewise, Summit Meadows, which is seasonally ponded in spring and perennially saturated close to the surface year-round, ensures base flow for the unnamed, perennial tributary to the Salmon River.

All of the streams near the quarry site and haul route can be considered relatively small in length, width, and average discharge. Although their contributing areas include the surrounding hill slopes, where a snowpack accumulates annually and rain-on-snow events periodically occur, these streams have a low sediment transport capability, even during flood events. This is primarily attributable to the low gradient and gentle relief of the valley bottom, the attenuating effect of wetlands and Trillium Lake, groundwater storage, and porous upland soils. Therefore, fluvial erosion is not considered to be a primary, naturally occurring, sediment-producing and transport mechanism for the Mud Creek catchment.

2.4 SOILS AND EROSION

Upland soils around the project area are dominated by moderately deep, gravelly sandy-loams and silt loams that have formed in colluvium of glacial till. They are cold, well-drained soils that support conifer plant associations typical of the Pacific Silver Fir Zone described by Franklin and Dyrness (1969). Limitations associated with the properties of these soil types include difficulties with regeneration due to heavy brush competition and severity of slope. Even though these soils are somewhat resilient to

disturbance and possess a good infiltration capacity, they exhibit a moderate surface erosion potential, due primarily to slope.

Soil characteristics around the quarry site and along portions of the haul route are similar, but the quarry site itself is underlain directly by igneous rock, where in places, soils are very shallow or wholly lacking (Howes 1979). Drilling records indicate that samples collected from several old test borings at the site were andesite, and that at a depth of about 60 to 80 feet materials became decomposed and highly weathered. Records also indicated that there were no noteworthy groundwater sources encountered (Deroo pers. comm. 2003).

Several soil types are associated with valley bottom settings around the project area. Most of those directly adjacent to the haul route are cold, deep, loamy sands and silt loams that have formed in glacial till and that tend to be either well drained or somewhat poorly drained. There are also wet meadow soils and poorly drained forested bottom lands that occur along the haul route, mainly between Trillium Lake and Summit Meadows. These soils have a high water detention potential and exhibit a low surface erosion potential. Limitations associated with these soils include permanent or seasonal inundation, and permanent or seasonal high water tables. Wet soil types are considered sensitive to ground disturbing activities (Howes 1979).

The natural erosion regime associated with the Mud Creek catchment where the project is located is primarily related to periodic disturbance. Since landforms in the vicinity are mostly stable and fluvial processes are relatively slight, mass wasting and stream-related erosion are not dominant, sediment-producing mechanisms. Additionally, porous upland soils with good infiltration capacity, along with the attenuating effects of valley bottom soils to store water and a ubiquitous cover of litter and forest vegetation, combine to limit the effects of runoff and raindrop splatter that induce surface erosion. Rather, it is probable that the highest rates of naturally occurring erosion were temporarily provoked when a disturbance such as intense wildfire caused bare soil to be exposed to erosive forces. Accelerated rates of surface erosion could have occurred for a time afterward until a protective cover of vegetation was reestablished. Most prone would have been upland soil types on moderately steep to steep slopes, which exhibit a moderate to high surface erosion potential when they are bare and devoid of cover. Other more minor forms of erosion exist. Slow-acting soil creep and periodic rock fall probably play a negligible role in the natural erosion regime, only occurring where rock outcrops, steep slopes, and areas where high water tables occur on steep slopes. Under natural conditions, areas in the vicinity of the quarry site and haul route were not generally subjected to intense rates of surface erosion or large quantities of sediment production.

Human disturbance, however, has exposed surface soils to erosive forces in the project vicinity. The Salmon River Watershed Analysis (1995) indicates that this is attributed mostly to the presence of roads, and estimates that road related sediment delivered to water bodies in the Mud Creek catchment could potentially amount to 160 tons annually.

Of particular concern are road segments composed of dirt or gravel surfacing. In the Mud Creek catchment, the greatest potential for road-generated sediment to be delivered to a water body is where gravel and dirt roads cross over streams – for example, where Forest Road 2656-309 crosses Mud Creek, which is one-quarter mile west of the quarry site (USFS 1995).

Where road segments are near a water body, such as a stream crossing, sediment delivery potential is high. Along the haul route, streams pass under the road in about a dozen locations. However, the haul route consists of asphalt surfacing where it crosses streams. So, except where there are bare-cut banks and ditch lines, sediment generated from the haul route is very slight when compared to that which is potentially produced from roads with dirt or gravel surfacing.

Road sanding during winter months can be another potential source of sediment delivery to streams. Highway 26 is the nearest road to the Mud Creek catchment that is sanded. However, because there are no above-ground flow routes that directly connect the highway with water bodies in the Mud Creek catchment there is little potential for sanding materials to be delivered from the highway to any of the water bodies near to the haul route or quarry site. The haul route is closed in winter and is not sanded.

Areas in the catchment where timber harvest activities occurred in the past are considered to contribute less sediment than roads (USFS 1995). Currently there are no harvest operations occurring in the catchment, and all of the areas that have been previously logged are young plantations where a protective ground cover has established. Except for the remaining roads, any adverse impacts related to accelerated rates of erosion caused by timber harvest activities are diminishing.

At the quarry site, signs of accelerated surface erosion are evident. It is a large, poorly vegetated open area consisting of an upper and lower pit where rock materials have been extracted and sorted into a wide variety of sizes for various purposes. Much of the rock that was originally quarried was crushed into material of pit run, gravel, and sand size for road construction and highway sanding projects. Copious amounts of unconsolidated sand and fine soil material are scattered loosely throughout the site, or have been arranged into piles and berms for storage. In places, some of the fine fraction materials have been mobilized and transported via concentrated runoff from water bars and hardened driving surfaces to a broad, shallow headwater swale on the south side of the quarry site.

Large, deep deposits of fine material can be readily observed in and around the margins of the broad shallow swale adjacent to the south side of the quarry site. Given the extent of these deposits, runoff from the site and the resultant sediment transport appears to have been occurring seasonally for many years. Large openings in the forest, such as that offered by the quarry site, are capable of accumulating a snowpack deeper than normal. In the spring, these exposed openings tend to melt earlier and faster than areas under the

shade of a forest canopy. The combination of a deeper snow pack with an earlier and faster melt rate in the spring potentially increases runoff and erosive energy. The snow that accumulates in the quarry every winter melts every spring, and the runoff erodes loose, fine material located directly in the flow routes. Some efforts have been undertaken in the past, with limited success, to control erosion at the quarry site. Currently, erosion control structures at the site are in relatively poor condition and marginally effective, presumably due to vandalism, off road vehicle use, the seasonal snowpack, and infrequent maintenance.

Sediment deposited to the swale from the quarry site does not appear to have undergone considerable transport farther downhill. The majority of spring runoff in the broad swale appears to be subsurface flow, as there are only several places where signs of water at the surface are apparent and there is no continuous channel extending downhill. Thus, the current potential for the sediment deposited in the swale to be transported to a perennial water body such as Mud Creek, one- quarter mile downhill, is very low. These deposits, however, have been encroaching upon a seep located in the bottom of the broad swale about 250 feet from the south edge of the lower pit of the quarry site, a condition that could be judged as inconsistent with standard and guideline FW-084 in the Mt. Hood National Forest's Land and Resource Management Plan.

2.5 WATER QUALITY

The single beneficial use listed by the Oregon Department of Environmental Quality (DEQ) for the Sandy River Basin that applies to water bodies that are in direct contact with the project area is categorized as resident fish and aquatic life. Beneficial uses applicable to other notable water bodies nearby, particularly Trillium Lake include boating, fishing, and water contact recreation (OAR, chapter 340-410). There are no streams or stream segments in the Mud Creek catchment and project area included on the DEQ 2002 303(d) list of water quality-impaired water bodies (DEQ 2003) for the applicable beneficial uses.

While there are no known temperature concerns for streams flowing near the haul route or quarry site, the Salmon River Watershed Analysis (1995) identifies increased water temperature as a potential concern for nearby Mud Creek, despite the high-quality sources of cold water from springs and wetlands in the area. Data obtained from continuous monitoring conducted in 2002 and 2003 detected temperatures downstream from Trillium Lake that for several periods during the summer exceeded 64° Fahrenheit, the standard for the 7 day average maximum water temperature established by DEQ for the Sandy River subbasin. The cause was attributed to the capability of the surface area of Trillium Lake to intercept solar radiation, along with stream side shade conditions at the time, and discharge sun-warmed waters to Mud Creek.

The Salmon River Watershed Analysis (1995) also noted the potential for fine sediment to be delivered to streams from certain road segments in the Mud Creek catchment.

Notable increases of fine sediment can have deleterious effects upon the quality and quantity of aquatic habitat. Low-gradient stream reaches such as those of Mud Creek below Trillium Lake were noted as being susceptible sites where fine sediment could potentially accumulate, causing undesirable effects to the quality of pool habitat. Of particular concern were contributing road segments with gravel or dirt surfaces near a water body. Segments of the haul route cross a number of streams, but since the haul route is surfaced with asphalt, the potential for large quantities of sediment to be delivered from its surfaces to streams is low. The potential for sediment to be delivered to a stream from the quarry site is also low, partly due to its distance from the nearest perennial stream, but also because there is no continuous channel nearby that connects surface flow directly with water bodies downstream.

2.6 WETLANDS AND FLOODPLAINS

Several wetlands in the valley bottom are near the haul route. They are palustrine types as defined by Cowardin (1979), and consist primarily of a combination of emergent, shrub-scrub, and forested classes. Most notable is a complex of wetlands associated with Summit Meadows. These wetlands are connected with Red Top Meadows, which in turn are connected to Salmon River Meadows. Although the haul route is somewhat removed from, and not directly adjacent to, Summit, Red Top, or Salmon River Meadows, it does cross through a wetland corridor that connects with them near the junction with Forest Road 2656-131, about one-half mile south of U.S. Highway 26. The haul route also crosses through a number of wet forest bottom lands between Trillium Lake Campground and the quarry site. There are no wetlands directly adjacent to the quarry site.

There are no jurisdictional, 100-year floodplains recognized by the Federal Emergency Management Agency or Army Corps of Engineers in the project area.

2.7 PERTINENT AGENCY DIRECTIVES

The Salmon River Watershed Analysis (1995) identifies land use allocations within the Mud Creek catchment designated by the Mt. Hood National Forest Land and Resource Management Plan (LRMP) (USFS 1990) and the Northwest Forest Plan (NWFP) (1994). Those that apply to the project area include B2 Scenic Viewshed and C1 Timber Emphasis. Standards and Guidelines associated with these designations direct strategic and project-level planning, as well as land uses within their bounds. In addition to these directives, others to be considered in context of the activities and operations proposed in this DEIS include those listed as Forestwide Standards and Guidelines in the LRMP for water, soil, and riparian resources, as well as transportation and access and travel management, and minerals management.

Forestwide Standards and Guidelines (S&Gs) to be considered in relation to the proposed activities include those for minimizing or preventing undesirable impacts to water, soil, and riparian resources that could result from the use and maintenance of the

transportation system (haul route) and the activities for expanding the quarry site. Those for consideration that most apply to the proposed activities include the following S&Gs (paraphrased):

- FW-025/026 Achieving effective ground cover
- FW-027 Removal and sale of topsoil
- FW-059 Implementation of individual Best Management Practices
- FW-060 Preventing the degradation of water quality and natural drainage
- FW-063/064 Watershed impact areas should not exceed 15 percent
- FW-066 Cumulative effects analysis
- FW-075/076 Protection from chemical and hazardous materials
- FW-084 Preventing sediment delivery to riparian areas
- FW-398 Administration of minerals on sale or permit basis in accordance with 36 CFR 228, subpart C
- FW-416 Design standards for proposed road reconstruction
- FW-422/423/424 Minimizing impacts to soil and water resources
- FW-427 Minimizing disturbance to natural drainage patterns

(Note: there are a number of water, soil, and riparian Forestwide S&Gs that are the same or very similar between resource areas. For the sake of brevity and to minimize redundancy, some were omitted from this list.)

3 ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION / ANALYSIS METHODOLOGY

A qualitative method was used to analyze the effects of the proposed alternatives. This method was employed for several reasons. Because watershed and soil resources were not topics identified as significant issues during the scoping process, a more stringent, quantitative detailed analysis was not deemed necessary. Secondly, because the haul route is not proposed to change beyond existing conditions and its use would not necessitate ground-disturbing activities, an in-depth and detailed analysis would probably not reveal distinct, measurable differences between the alternatives. Additionally, direct hydrologic pathways and links between streams or water sources is lacking, and there are no continuous channels that come in contact with, or are near the expanded quarry site in any of the alternatives. As a result, detailed, in-depth analysis would also probably result in very little or no measurable distinctions between the alternatives.

Standard practices and procedures for analyzing particular impacts to soil and water resources were considered as an approach for identifying simple cause-and-effect relationships between proposed activities and the natural conditions and physical

characteristics of the project area. Cause and effect relationships were considered in the context of standard procedures defined in the U.S. Environmental Protection Agency's publication, *An Approach to Water Resources Evaluation of Non-Point Silvicultural Sources (A Procedural Handbook)* (EPA 1980). The primary items considered for concluding effects were the footprint areas of ground disturbing activities. Secondary items included activities not considered ground disturbing.

3.2 HYDROLOGY, STREAMFLOW, AND CHANNELS

3.2.1 Effects Common to All Alternatives

Expansion of the quarry site for all alternatives can be considered a created opening. The removal of forest vegetation can effectively reduce interception and transpiration and increase snow accumulation, thereby increasing the amount of net precipitation available for runoff. These effects can alter the hydrograph and have been shown to hasten the timing and accentuate the magnitude of peak flows, particularly those resulting from high precipitation and rain-on-snow events (Harr et al. 1975).

Likewise, expansion as well as operations at the quarry site would create heavily compacted and hardened surfaces, where the capability for infiltration and water transmissivity into underlying materials is greatly diminished, which would also increase the amount of precipitation available for runoff.

As an indirect result, elevated peak flows resulting from created openings and hardened surfaces can lead to excessive stream bank erosion, channel scour, and downcutting; particularly if sensitive streambanks similar to those noted along the lower reaches of Mud Creek are present. For small watersheds in the western Cascades within the transient snow zone, such as the Mud Creek catchment, effects of created openings begin to become pronounced when the amount of area consisting of a well developed, hydrologically mature forest canopy (represented here as forest stands older than about 15 to 30 years of age), is decreased by about 20 percent (Bosch and Hewlett 1982, USFS 1990). The extent that hydrologic conditions are altered depends upon the amount of area in a hydrologically immature status.

The primary difference between the alternatives is the comparative size of the opening that would be created as a result of the quarry expansion, and the expanded size and extent of hardened surfaces. The haul route and its footprint are the same for all of the alternatives. Its location, design, and materials would remain as is for all of the alternatives. There are no proposed improvements, upgrades, reconstruction, or other actions associated with the haul route that would necessitate ground-disturbing activities. Hence, there are no additional impacts predicted to streams or channels as a direct or indirect consequence of its physical presence and location. Existing effects to streams and channels are attributable to current uses, and would not be expected to increase or decrease for any of the alternatives.

Under each of the alternatives, the closest water body to the quarry site would be a small, seasonally wet seep located roughly 250 feet to the south, in a broad swale.

3.2.2 Effects Common to Action Alternatives 1 and 2

The size of the created opening that would result from expansion of the quarry site in Alternatives 1 and 2 would be 70 and 50 acres, respectively. Created openings of this size in a small forested watershed are considered rather large. In the western Cascades, openings of this size would tend to receive appreciably more rainfall because there would be very little loss due to interception by a forest canopy. An accumulation of a snowpack notably deeper than that of surrounding forested areas could be expected. In the spring, snow that had accumulated in the opening could melt earlier and faster than normal. Hardened surfaces at the site would limit the amount of precipitation and snowmelt that could infiltrate into the ground. Combined, these factors could cause a noticeable increase in available runoff from the quarry site.

Depending upon the degree of incline, arrangement, and distribution of hardened surfaces at the site, available runoff could become concentrated and directed in various flow routes. If a substantial proportion of the available runoff were directed off-site toward the broad swale south of the project area, then a notable increase could occur in the amount of water that is normally contributed to its contributing area.

As an indirect result, what would normally be subsurface interflow in the swale could become surface flow during periods of high antecedent soil moisture. Recurrence of such conditions over the span of numerous seasons might induce channel-forming processes. Small connected channel segments could begin to develop, altering the hydrology of the swale and its current capacity to store and retain moisture. Existing seeps and vernal pools would possibly disappear as a consequence, and the ability of the swale to store and retain sediment reversed.

The effects of openings in forested areas of the region can also influence base flows. Increases in the amount of precipitation available as runoff, particularly spring snow melt, can result in elevated inputs to groundwater via infiltration into the soil complex. Given the large opening that would result from quarry expansion, there is a potential for intercepted precipitation at the quarry site to become stored groundwater available as localized contributions supporting base flow. Localized contributions at the catchment scale, however, would have little effect on base flows, including their magnitude and duration.

The duration of hydrologic effects at the site-specific scale attributable to the large quarry site in Alternatives 1 and 2 might last as long as the presence of the created opening and hardened surfaces persist. If left unmitigated, effects could persist for many decades until a hydrologically mature canopy becomes developed over most of the quarry site, and the extent of hardened surfaces sufficiently reduced.

3.2.3 Alternative 1 (Proposed Action)

As a direct consequence of implementing Alternative 1, a non-forest patch approximately 70 acres in size would be created due to quarry expansion, a 48-acre increase above the size of the existing quarry. The opening would comprise about 1.6 percent of Mud Creek's total catchment area. Additionally, ground-disturbing activities associated with quarry expansion and operations could be expected to expand the amount of heavily compacted surface area at the site by nearly three times its current size.

The maximum opening size expected as a result of quarry expansion under Alternative 1 would decrease the amount of area in a hydrologically mature condition in the Mud Creek catchment by about 1.1 percent. The potential effect of a created opening of this size upon the hydrograph is considered to be low at the catchment scale (7^{th} field hydrologic unit). Considering the slightly elevated peak flow estimates for the existing condition, and the moderately small percentage of the catchment converted to an opening in this alternative, the potential for notable alterations to the magnitude, timing, and duration of peak flows attributable to quarry expansion would be low and likely undetectable. Hence, the potential for undesirable channel effects such as excessive channel scour and bank erosion to Mud Creek, including its lower sensitive reaches, is expected to be low.

At the site-specific scale, hydrologic effects resulting from this alternative could be noticeable, as discussed above under 3.2.2, Effects Common to Alternatives 1 and 2.

3.2.4 Alternative 2

As a direct consequence of implementing Alternative 2, a non-forest patch approximately 50 acres in size would be created due to quarry expansion, a 28-acre increase above the size of the existing site. The opening would comprise about 1.1 percent of Mud Creek's total catchment area. Additionally, ground-disturbing activities associated with quarry expansion and operations could be expected to expand the amount of heavily compacted surface area at the site by approximately two times its current size.

The maximum opening size expected as a result of quarry expansion under Alternative 2 would decrease the amount of area in a hydrologically mature condition in the Mud Creek catchment by about 0.6 percent. The potential effect of a created opening of this size upon the hydrograph is considered to be low at the catchment scale. Considering the slightly elevated peak flow estimates for the existing condition, and the somewhat small percentage of the catchment converted to an opening in this alternative, the potential for notable alterations to the magnitude, timing, and duration of peak flows attributable to quarry expansion would be low and undetectable. Thus, the potential for undesirable channel effects such as excessive channel scour and bank erosion to Mud Creek, including its lower sensitive reaches is expected to be minimal.

At the site-specific scale, hydrologic effects resulting from this alternative could be noticeable, as discussed above under 3.2.2, Effects Common to Alternatives 1 and 2.

3.2.5 Alternative 3 (No Action)

As a direct consequence of the No Action Alternative, a non-forest patch approximately 29 acres in size would be created due to quarry expansion, a 7-acre increase above the size of the existing site. The opening would comprise about 0.6 percent of Mud Creek's total catchment area. Additionally, ground-disturbing activities associated with quarry expansion and operations could be expected to expand the amount of heavily compacted surface area at the site by approximately one-third.

The maximum opening size expected as a result of quarry expansion under the No Action Alternative would decrease the amount of area in a hydrologically mature condition in the Mud Creek catchment by less than 0.2 percent. The potential effect of a created opening of such small size upon the hydrograph and peak flows is considered to be negligible at the catchment scale. Thus, undesirable effects such as excessive channel scour and bank erosion to Mud Creek, including its lower sensitive reaches would not be expected.

At the site-specific scale, the created opening at the quarry site would tend to accumulate a deeper-than-normal snowpack. In the spring, the snow covering the exposed opening could melt earlier and faster than areas under the shade of a forest canopy. Hardened surfaces at the site would limit the amount of snow melt that could infiltrate into the ground. Combined, these factors would cause an increase in available runoff from the quarry site. However, since there are no continuous surface flow-routes directly connecting the quarry site with a stream, noticeable effects to channels resulting from elevated runoff would not be expected. Instead, available runoff would infiltrate into the ground soon after leaving the quarry site.

The duration of hydrologic effects at the site-specific scale attributable to the quarry site could be expected to last as long as the presence of the created opening and hardened surfaces persists. Although overall hydrologic effects are considered slight compared to Alternatives 1 and 2, they would remain until a hydrologically mature canopy becomes developed over most of the quarry site, and the area of hardened surfaces sufficiently reduced. At the catchment scale, the effects attributable to the quarry site, which are considered to be negligible, would diminish even further over time. As re-growth in clearcut areas continued to develop, the amount of hydrologically mature stands would increase in the catchment (assuming no future, widespread clear cut harvest).

3.2.6 Mitigation

Under both of the action alternatives, detailed excavation and reclamation plans would be developed throughout the course of operations and expansion. At the minimum these should identify measures for yearly runoff and sediment control, including the placement

of runoff control structures at the quarry site that are resistant to vandalism and off road vehicle use (e.g., rock check dams, retention berms, drainage ditch lines, waterbars, infiltration drains, shallow evaporation basins).

3.3 SOILS AND EROSION

3.3.1 Effects Common to All Alternatives

The haul route and its footprint are the same for all of the alternatives. Its location, design, and materials would remain as is for all of the alternatives. There are no proposed improvements, upgrades, reconstruction, or other actions associated with the route that would necessitate ground disturbing activities. Hence, there are no additional impacts predicted to occur to soil resources underlying the haul route as a direct or indirect consequence of its physical presence and location. Existing effects to soil resources are attributable to current uses, and would not be expected to increase or decrease for any of the alternatives.

3.3.2 Effects Common to Action Alternatives 1 and 2

Where road segments come near to a water body, such as a crossing over a stream, the potential for sediment delivery can be high, particularly if they are gravel or dirt roads. Along the haul route, there are about a dozen locations where streams pass under the road. However, because the haul route consists of asphalt surfacing, except where there are bare cut banks or ditch lines, sediment generated from the haul route would typically be considered very light.

Under Alternatives 1 and 2, however, there would be a substantial increase above the No Action Alternative in the amount of traffic using the haul route, attributable directly to periodic intensive hauling, which would occur during the non-winter months as needed. Recurring periods of heavy traffic, especially with heavy trucks and equipment, can have deleterious effects upon roads, gradually breaking them down and dislodging and pulverizing materials from their surfaces.

Because Alternatives 1 and 2 forecast more periods of intense haul using heavy trucks, there is a higher potential for these alternatives to generate sediment by traffic from the haul route than would be generated by the No Action Alternative. Likewise, since the haul route crosses a number of small channels of both perennially and seasonally flowing streams, there is greater potential for a portion of haul-related sediment to enter water. Despite these factors, the increase in the amount of related sediment that could be available to enter streams is concluded to be slight.

Typically, gradual and incremental wear on asphalt surfaces from heavy traffic is indiscernible on a near-term basis. Except where there are weak spots, such as pot holes or ruts, pavement deterioration is generally considered to be relatively slow. Periods of elevated traffic on the haul route would occur intermittently over the life of the project,

but in between there would be long periods when no quarry-related traffic would occur. During winters, for example, the haul route would be entirely closed to traffic. Additionally, gradual wear would be distributed over the entire haul route, not just close to a water body. Also, routine maintenance would occur under the action alternatives for regularly repairing any damage that might arise. Hence, periodic extensive haul is not expected to cause an excessive amount of pavement degradation that would lead to the production of an appreciable amount of fine sediment potentially deliverable to a water body.

Under both Alternatives 1 and 2, detailed excavation and reclamation plans would be developed throughout the course of operations and expansion. Since activities proposed in the action alternatives are expected to occur more often than those which currently occur under the existing Special Use permit (No Action), it can be assumed that activities prescribed by excavation and reclamation plans would also occur more regularly.

At the minimum, excavation and reclamation plans developed under Alternatives 1 and 2 should contain standard operating procedures to prevent accelerated erosion and contain sediment. Implementation of these measures would occur by far more frequently than the existing level of effort. Therefore, it is concluded that erosion and sediment control measures implemented under Alternatives 1 and 2 could result in a considerable decrease of sediment transport off site compared to the No Action Alternative.

3.3.3 Alternative 1

As a direct consequence of implementing Alternative 1, adverse impacts to soil resources could be expected over the greatest amount of area in relation to Alternatives 2 and 3. The maximum limits of the quarry site proposed for Alternative 1 provide a footprint size of approximately 70 acres. Proposed expansion of the quarry site to that size could be expected to result in ground-disturbing activities occurring across 48 acres in addition to the existing 22-acre site.

As a result of expansion, which would primarily occur outward from the east and north bounds of the site, the soil mantle and forest cover would be removed from most of the quarry area. Activities and use at the quarry would increase dramatically, including the use of heavy equipment, machinery, and vehicles, causing further ground disturbance that could be expected to render surfaces across much of the site heavily compacted and in a hardened state. Expansion and operations at the quarry site could result in a nearly three-fold increase in the amount of area exposed and heavily compacted.

Due to the comparative size of the expanded quarry site under this alternative, which could substantially increase the amount of available runoff and sediment, the potential for sediment delivery off site is very high. Fully expanded, the 70-acre quarry site would mostly be bare and void of a vegetative cover. Any exposed soil, sand, and fine aggregate materials at the site could be subjected to erosive forces from wet season rains, spring

snowmelt, and concentrated runoff. Proposed expansion in this alternative would expose the greatest total area to erosive forces, and enlarge the amount of hardened surfaces extensively, thereby increasing the potential for accelerated surface erosion and sediment delivery offsite. This could result in the need for a substantially greater effort to minimize accelerated erosion and contain sediment compared to the No Action Alternative.

Removal of the soil mantle, in conjunction with an enlargement of compacted surfaces, would relate to a loss of inherent long-term site productivity over the 70-acre expanded quarry site, equal to a three-fold increase in the amount of affected area compared to the No Action Alternative. Soil conditions would be severely diminished, making the site incapable of supporting forest vegetation for decades. Conversion of the site to a non-productive status would add 48 acres to the amount of area currently in a non-productive condition in the project vicinity and Mud Creek catchment (i.e., many of the existing road segments).

The conditions described for this alternative could be expected to continue as long as the quarry site persists. Reclamation could eventually restore some of the area to a productive status, but the productive capacity could be expected to remain below natural levels across the 70-acre site over the long term.

3.3.4 Alternative 2

As a direct consequence of implementing Alternative 2, adverse impacts to soil resources could be expected to be somewhat greater than the No Action Alternative, but markedly less than Alternative 1. The maximum limits of the quarry site proposed for Alternative 2 provides a footprint size of approximately 50 acres. Proposed expansion of the quarry site to that size would result in ground-disturbing activities occurring across 28 acres in addition to the existing 22-acre site.

As a result of expansion, which would primarily occur outward from the east and north bounds of the site, the soil mantle and forest cover would be removed from most of the quarry area. Activities and use at the quarry would increase considerably, including the use of heavy equipment, machinery, and vehicles, causing further ground disturbance that would render surfaces across much of the site heavily compacted and in a hardened state. Expansion and operations at the quarry site could result in an approximately two-fold increase in the amount of area exposed and heavily compacted.

Due to the comparative size of the expanded quarry site, which could distinctly increase the amount of available runoff and sediment, the potential for sediment delivery off site is high under Alternative 2. Fully expanded, the 50-acre quarry site would mostly be bare and without vegetative cover. Any exposed soil, sand, and fine aggregate materials at the site would be subjected to erosive forces from wet season rains, spring snowmelt, and concentrated runoff. Proposed expansion in this alternative would notably increase the total area exposed to erosive forces, and enlarge the amount of hardened surfaces

appreciably, thereby increasing the potential for accelerated surface erosion and sediment delivery offsite. This could result in the need for a substantially greater effort to minimize accelerated erosion and contain sediment compared to the No Action Alternative.

Removal of the soil mantle in conjunction with an enlargement of compacted surfaces would result in a loss of long-term site productivity over the 50-acre expanded quarry site, equating to an approximately two-fold increase in the amount of affected area compared to the No Action Alternative. Soil conditions would be severely diminished, making the site incapable of supporting forest vegetation for decades. Conversion of the site to a non-productive status would add 28 acres to the amount of area currently in a non-productive condition in the project vicinity and Mud Creek catchment.

The conditions described for Alternative 2 could be expected to continue as long as the quarry site persists. Reclamation could eventually restore some of the area into a productive status, but the productive capacity could be expected to remain below natural levels over the long term across the 50-acre quarry site.

3.3.5 No Action Alternative

As a direct consequence of implementing the No Action Alternative, adverse impacts to soil resources would be less than those for Alternatives 1 and 2. The maximum limits of the quarry site proposed for the No Action Alternative provides a footprint size of approximately 29 acres. Proposed expansion of the quarry site to that size could be expected to result in ground-disturbing activities occurring across 7 acres in addition to the existing 22-acre quarry.

As a result of quarry expansion, which would occur primarily outward from the east bounds of the site, the soil mantle and forest cover would be removed from most of the quarry area. Activities and use at the quarry could increase somewhat, and include the use of heavy equipment, machinery, and vehicles, causing some additional ground disturbance, which could render some of the surfaces across the expanded portions of the site heavily compacted. Expansion and operations at the quarry site would increase the amount of area exposed and heavily compacted by approximately one-third.

Currently, the quarry site is exposed and poorly vegetated, and contains a large source of unprotected sediment. Its compacted surfaces are prone to concentrating runoff in the spring or during heavy precipitation events. As evidence, sediment deposits are readily observable in the broad swale immediately south of the project area and can easily be traced directly to the quarry site. Transport of sediment off site from the quarry appears to have been occurring for many seasons, primarily from snowmelt runoff. Expanding the quarry site by 7 acres could increase somewhat the amount of available runoff and sediment. The potential for off-site sediment transport would remain moderate to high under the No Action Alternative.

The absence of a soil mantle, in conjunction with the presence of compacted surfaces at the site, relates to a loss of inherent long-term site productivity over an estimated 29 acres. Expansion of the quarry site could increase the amount of affected by approximately one-third over the existing condition. Soil conditions at the quarry would remain severely diminished, making the site incapable of supporting forest vegetation for decades. Conversion of the site to a non productive status would cumulatively add 7 acres to the amount of area currently in a non productive status in the surrounding vicinity and Mud Creek catchment.

The conditions described for the No Action Alternative could be expected to persist at the quarry site for the long term. Reclamation would not occur until extraction of rock materials was complete. Even though reclamation would be aimed at restoring the site back to a vegetated status, it would not fully restore productivity to a pre disturbance capacity. Current practices to reduce elevated rates of erosion and contain levels of sediment under the No Action Alternative would continue to be minimally effective. Existing erosion control structures are only marginally functional. Despite their presence, it is evident that sediment generated from quarry surfaces has moved offsite, particularly on the south side of the quarry. Due to the poor condition of existing erosion control structures, it is presumed that maintenance intervals are sporadic.

3.3.6 Mitigation

Under both of the Action Alternatives, detailed excavation and reclamation plans would be developed and approved by the FS throughout the course of operations and expansion. At the minimum these should identify measures for annual erosion and runoff control, and sediment containment, including the following provisions.

1. Place and arrange stock piled soil, rock, or waste materials away from drainage and runoff pathways.

2. Prior to ceasing operations each year (i.e., before heavy snow closes the haul route), for the entire length of FS road 2656-955, as well as the first 0.1-mile segment of FS road 2656-903, and the intersecting segments of FS road 2656: install appropriately spaced structures to drain and dissipate concentrated runoff from road treads and ditch lines (e.g., culverts, waterbars, dry trenches below cross drain outlets, inboard drainage to ditch lines, check dams, etc.).

3. Place runoff control structures at the southern edge of the quarry site that are resistant to vandalism and off-road vehicle use (e.g., constructed benches, rock check dams and filters, rock containment berms, waterbars, infiltration drains, shallow evaporation basins, etc.).

4. Suspend operations, including haul, during excessively wet and high runoff events as determined by the Forest Service Road Manager.

5. Establish an effective ground cover over reclaimed and stock piled soils, including the use of seasonally rigorous species adapted to the site and capable of rebound from seasonal snowpack (e.g., prolific pioneer species enhanced by disturbance, such as long-stolon sedge and pearly everlasting).

Additionally, specific mitigation measures pertaining to stockpiled soil materials could greatly enhance reclamation efforts at the quarry site. During quarry expansion, removal of the soil mantle would entail scraping it nearly down to underlying rock, then stockpiling it on site for subsequent reclamation purposes. In the process surface and subsurface soil horizons would become mixed, altering several natural physical properties such as structure, porosity, and the distribution and arrangement of organic matter. Soil amendments could greatly enhance altered physical conditions by improving the nutrient status of stockpiled soils. Soil amendments used at the site should be approved by a FS botanist.

To reclaim and restore stockpiled soil materials to their inherent productive capability, measures beyond those typical of standard operating procedures could be necessary. These include not only seasonal applications of special soil amendments to enhance nutrient status and increase the content of organic matter, but also efforts to keep the bulk density of materials within a certain range after they are redistributed. Excessively compacted conditions should be avoided as should excessively loose conditions. In a moist state, soil materials should be somewhat firm, but not overly so.

3.4 WATER QUALITY

3.4.1 Effects Common to All Alternatives

Heavy equipment and machinery that would be used in quarry and haul activities require the use of a variety of petroleum based fluids such as fuel, oil, and hydraulic fluid. These fluids would primarily be stored within the reservoirs and tanks of individual equipment and machinery, as well as in the tanks of service trucks. During operations, there would always be a possibility for accidents or breakdowns to potentially result in excessive leaks or spills.

Along the haul route, there would be some potential for a spill to enter a water body. If a spill were to occur, its potential to affect a water body would depend on its proximity and deliverable distance to it. The potential would be greatest during times when haul traffic is the highest. During most of the year, however, traffic would be low or non-existent, so the potential would be negligible. At the quarry site the potential for a spill to enter a water body and adversely effect water quality would be low too, because the nearest source is a small seasonal seep about 250 feet to the south of the project area, and it has no continuous channel that connects to a tributary downstream.

3.4.2 Effects Common to Action Alternatives (1 and 2)

Large, open, compacted surfaces located in the western Cascades would be capable of intercepting appreciable amounts of annual precipitation, potentially resulting in a noticeable increase in available runoff from the site. Runoff intercepted by hardened surfaces, such as roads, can be routed toward a water source. Roads, for example, can be links between sediment sources and streams, functioning as direct pathways for sediment to be delivered to water, potentially having an effect on water quality.

The quarry site in Alternatives 1 and 2 would be rather large (70 and 50 acres respectively), and a considerable portion of its surface would be hardened and heavily compacted. Available runoff originating from its surface during rain events or spring snow melt could be intercepted by the access road (Forest Road 2656-955). The access road, however, is not directly linked to any streams. Thus, sediment generated from the large quarry sites that are proposed in Alternatives 1 and 2 would not be expected to be routed to a stream. Of notable interest is Mud Creek, located about 0.4 miles to the west. There is no known direct or indirect link via road surfaces between the quarry site and Mud Creek. The potential for sediment generated from the quarry site to adversely affect the water quality of Mud Creek is considered low.

Because Alternatives 1 and 2 forecast more periods of intense haul using heavy trucks, there is a higher potential for these alternatives to generate sediment from traffic use beyond that generated by the No Action Alternative. Since the haul route crosses a number of small perennial and seasonal streams, the potential for a portion of haul-related sediment to enter water is somewhat greater. The amount of generated sediment that might be delivered to streams and adversely affect water quality, however, is expected to be slight because intense haul would occur only intermittently during non-winter months throughout the course of the permit, and would not be expected to be prolonged over a long time frame. Hence, degradation of asphalt surfaces attributable to intense haul over the haul route would not be excessive.

3.4.3 No Action Alternative

The Salmon River Watershed Analysis (1995) indicated a distinct potential for fine sediment to be delivered to streams from certain road segments in the Mud Creek catchment. Contributing road segments of particular concern were those with gravel or dirt surfaces near to, or crossing, a water body. Segments of the haul route cross a number of streams, but because it is surfaced with asphalt, its tread is not prone to generate sediment. Despite several short segments of the haul route where there are small bare-cut banks and ditch lines, the potential for plentiful quantities of sediment to be produced and delivered to a water body from its surfaces and adversely affect water quality is very low.

In general, traffic levels expected under the No Action Alternative would be relatively low, including times when material haul from the quarry site would occur. Under the No

Action Alternative, the potential for sediment from the quarry site to be delivered to a stream and adversely impact water quality is also low, primarily because no water body is directly connected to the quarry site. The nearest water body is a small, seasonally wet seep about 250 feet south of the project area, and it does not have a continuous channel directly connected with tributaries, or ultimately to Mud Creek downstream.

3.4.4 Mitigation

For all alternatives, excavation and reclamation plans would be developed that would contain provisions for erosion control and sediment containment and would be intended to minimize the effects of project related erosion to water quality (for additional detail regarding prescribed erosion control, see listed items in 3.3.6, Mitigation for soils and erosion).

Spill plans would be required as a condition of the special use permit. These plans would include provisions for containment and treatment of fluids in the event of a spill. At the minimum they would require rock filter berms to be located around above-ground storage tanks to contain potential spills, impervious filter materials beneath storage tanks to prevent petroleum based products from contaminating the site, and supplies of absorbent materials stored on-site or within close proximity to the haul route and quarry so that a certain level of immediate action can occur to prevent fluids from entering water bodies. Plans would primarily address petroleum-based fluids such as fuel, oil, and hydraulic fluid.

3.5 WETLANDS

3.5.1 Effects Common to All Alternatives

None of the alternatives propose ground-disturbing activities within or near known wetlands. No direct impacts to wetlands are anticipated as a result of quarry expansion and operations. Wetlands in the catchment are located primarily in the valley bottom, and are far removed from the quarry site. There are no known pathways, such as roads or streams that directly link the quarry site to wetlands. Existing effects to wetlands are attributable to current uses, and would not be expected to increase or decrease for any of the alternatives.

Along the haul route, there would be some potential for a spill to enter a wetland. If a spill were to occur, the potential for it to affect a wetland would depend on its proximity and deliverable distance to it. The potential would be greatest during times when haul traffic is the highest. During most of the year, however, traffic would be low or non-existent, so the potential would be low.

3.5.2 Effects Common to Action Alternatives (1 and 2)

Because Alternatives 1 and 2 forecast more periods of intense haul using heavy trucks, there is a higher potential for the action alternatives to generate sediment from traffic use than would be generated by the No Action Alternative. Since the haul route crosses a number of wet valley bottom areas, the potential for a portion of haul-related sediment to be delivered to a wetland is somewhat elevated. However, the amount of generated sediment that could be delivered to a wetland, potentially resulting in an adverse affect, is expected to be slight because intense haul would occur only intermittently during non-winter months throughout the course of the permit, and would not be expected to be prolonged over a long time frame. Hence, degradation of asphalt surfaces attributable to intense haul over the haul route would not be excessive.

3.5.3 Mitigation

Spill plans would be required as a condition of the special use permit. These plans would include provisions for containment of fluids in the event of a spill, and would require that at the minimum rock filter berms be constructed around above-ground storage tanks to contain potential spills, impervious filter cloth be installed beneath storage tanks to prevent petroleum based products from contaminating the site, and that supplies of absorbent materials be kept on-site or within close proximity to the haul route and quarry so that a certain level of immediate action can occur to prevent fluids from entering water bodies. Plans would primarily address petroleum-based fluids such as fuel, oil, and hydraulic fluid.

4 UNAVOIDABLE ADVERSE IMPACTS

Removal and stockpiling of soil resources for quarry expansion would adversely impact soils and soil productivity. Reclamation would ameliorate the condition to a degree, but soil properties would be drastically altered and nutrient status and water holding capacity diminished for the long-term.

5 SHORT-TERM IMPACTS VERSUS LONG-TERM PRODUCTIVITY

In the short term, adverse impacts to soil resources would result in a loss of long-term site productivity. The site would be converted to a non-forest condition. Reclamation efforts would not restore the capability of the entire site to support dense stands of conifers. The natural capability and productivity of the site would be diminished for the long term.

6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Expansion of the quarry site would considerably alter the natural topography of areas to the east and north of the existing site. Excavation of rock and stockpiling of soil materials would result in large quantities of materials being removed from the site. Reclamation

plans would not intend to restore the site to a near natural condition, but rather would be aimed at minimizing surface erosion and establishing effective ground cover. Due to expansion and excavation, the site would not be expected to become a densely stocked stand of mature conifers in the foreseeable future. Open areas lacking trees would remain features of the site for the long-term.

7 CUMULATIVE EFFECTS

When analyzing cumulative effects to soil and water resources; past, future, and reasonably foreseeable activities are considered within the context of a discrete land unit. In this case the land unit to consider for cumulative effects to soil and water resources is primarily the Mud Creek catchment, although the next higher level land unit, the Upper Salmon River Subwatershed is also considered. Future and foreseeable actions other than the proposed actions that are scheduled to occur in the Mud Creek catchment include the Salmonberry #5 commercial thinning EA, the Timberline Express Lift EIS, the Timberline fuels reduction EIS, and the Trails Master Plan for the Mt Hood area EA. Past activities include previous clearcuts, fire, road construction, and recreation development.

7.1 HYDROLOGY

At the catchment scale, the cumulative effects to peak flows attributable to the quarry site are considered to be low because such a relatively small area would be affected (<2%). Effects would diminish even further over time as regrowth continues to develop a forest canopy in once cut-over areas, gradually increasing the amount of area in a hydrologically mature condition in the Mud Creek catchment (assuming no future, widespread clearcut harvest).

The Salmon River Watershed Analysis concluded that in 1995 the forest canopy in the Mud Creek catchment functioned at 89 percent of a mature hydrologic condition. At that time, created openings in the form of roads and young, previously clearcut stands had accounted for an estimated 11 percent decrease from a hydrologically mature condition. It was further concluded that as a result of these conditions, there was a slight increase in the potential for adverse effects to occur as a consequence of elevated peak flows predicted for the 2+ recurrence storm interval. Such an increase is considered to be very low and probably undetectable.

Recent analysis conducted by the Forest Service using the methodology known as the Aggregate Recovery Percentage (ARP) estimated that currently, slightly less than 9 percent of the area in the Upper Salmon River 6th-field subwatershed is in a hydrologically disturbed status (Parker pers. comm.. 2004). Reiterating the analysis to determine the effect of cumulative actions, it was estimated that minor increases to ARP values would result, amounting to 9.0 and 8.9 respectively for Alternatives 1 and 2. These represent increases of less than 1 percent in the amount of area in the subwatershed

considered hydrologically disturbed. The opening that would be created as a result of quarry expansion would not cause ARP values to become appreciably elevated, for, in either action Alternative. Cumulative watershed effects would stay well below the limits set forth by forestwide standard and guideline FW-064, which establishes a maximum acceptable limit of less than 35 percent. As such, the potential for adverse cumulative effects to peak flows in the catchment to result from past, present, and future actions is considered negligible.

7.2 SOILS

Past actions that have caused adverse impacts to soil resources within the Mud Creek catchment include timber harvest (including road construction and use), some minor rock quarrying, and recreation development. Current and future actions that could affect soil resources include those listed as cumulative actions above. Combined, these actions will result in the cumulative accrual of detrimental soil conditions in the Mud Creek catchment.

Detrimental soil conditions could be expected to increase in the Mud Creek catchment incrementally over time, particularly with repeated harvest entry where ground-based harvest systems would be employed. Impacts would be isolated to harvest units and minimized to the extent possible by implementing best management practices (BMPs) and related rehabilitation efforts.

Sediment-related impacts attributable to current and foreseeable actions in the Mud Creek catchment would be minimal due to the implementation of BMPs and Northwest Forest Plan standards and guidelines requiring Riparian Reserve buffers that prevent indirect effects to soil and water resources from accelerated erosion. Additionally, the implementation of BMPs such as erosion control, along with restoration projects in the catchment would minimize accelerated erosion from isolated sites. Overall, accelerated erosion and sedimentation resulting from cumulative actions would increase only slightly over the entire area of the Mud Creek catchment.

The presence and use of roads would continue to seasonably contribute fine sediment to water sources within the Mud Creek catchment. Related sediment delivery would be minimized at very local sites, particularly at road crossings with gravel or native surfacing. Periodic increases could be expected temporarily in response to periods of heavy traffic and use such as log and material haul, summer recreational traffic as well as during peak runoff events. Overall, however, road-related erosion is not expected to increase or decrease markedly over the long term.

8 REFERENCES

Bosch and Hewlett. 1982. A review of catchment experiments to determine the effects of vegetation changes in water yield and evapotranspiration. *Journal of Hydrology 55*:3-23.

Cowardin, L.M., Carter, V., Golet, F.C, and LaRoe, E.T. 1979. *Classification of wetlands and deepwater habitats of the United States*. U.S. Fish and Wildlife Service Publication FWS/OBS-79/31. Washington, D.C.

Department of Environmental Quality (DEQ). 2003. Oregon's 2002 Water Quality Status Assessment Report (Section 305(b) Report). Portland OR.

Environmental Protection Agency (EPA). 1980. *An approach to water resources evaluation of non-point silvicultural sources (a procedural handbook)*. United States Environmental Protection Agency, Environmental Research Laboratory, Athens, GA.

Franklin, J.F., and C.T. Dyrness. 1969. *Vegetation of Oregon and Washington*. U.S. Department of Agriculture, Forest Service, Pacific Northwest Range and Experiment Station. Research Paper PNW-80. Portland, OR.

Harr, R.D., W.C. Harper, J.T. Drygier, and F.S. Hsieh. 1975. Changes in storm hydrographs after road building and clearcutting in the Oregon Coast Range. *Water Resources Research 11(*3): 436-444.

Howes, S. 1979. *Soil resource inventory of the Mt. Hood National Forest*. U.S. Forest Service, Mt. Hood National Forest, U.S. Department of Agriculture, Sandy, OR.

Personal communication. Deroo, Tom, geologist, Mt Hood National Forest. Spring, 2003.

Personal communication. Parker, Todd, hydrologist, Mt Hood National Forest. Email dated February 18th, 2004.

U.S. Forest Service (USFS). 1990. *Land and Resource Management Plan*. U.S. Forest Service, Mt. Hood National Forest, U.S. Department of Agriculture, Sandy, OR

U.S. Forest Service (USFS). 1995. *Salmon River watershed analysis*. U.S. Forest Service, Mt. Hood National Forest, U.S. Department of Agriculture, Sandy, OR

Final Tamarack soil water report.doc

Appendix C: Fish and Wildlife Biological Evaluation and Report

Changes between Draft and Final EIS:

- Updated discussions on survey and manage species
- Updated discussions on federally listed anadromous fish species

Biological Evaluation and Fisheries and Wildlife Report for the Tamarack Quarry Expansion Project

---

Mt. Hood National Forest

Zigzag Ranger District

Clackamas County, Oregon

Prepared for and Reviewed by:

Forest Service – Mt. Hood National Forest
Zigzag Ranger District
70220 E. Highway 26
Zigzag, Oregon 97049

Prepared by:

David Evans and Associates, Inc.
2100 SW River Parkway
Portland, Oregon 97201

January 2006

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

David Evans and Associates, Inc. (DEA) prepared this biological evaluation (BE) and Wildlife Report for the Tamarack Quarry Expansion Project on the Mt. Hood National Forest, Zigzag Ranger District, Clackamas County, Oregon. This BE was prepared to document compliance with the Northwest Forest Plan (USDA and USDI, 1994) and the Mt. Hood National Forest Land and Resource Management Plan (LRMP) (USDA, 1990). The applicant (USDA Forest Service [FS]) is seeking permission under the National Environmental Policy Act (NEPA) and related special uses permits to complete the project. This document addresses Endangered Species Act (ESA) listed fish and wildlife species; FS sensitive species of wildlife and fish; Northwest Forest Plan survey and manage species; and management indicator species that are known to occur, or are likely to occur, within the project area, as indicated by the FS. Potential effects to federally-listed northern spotted owl (*Strix occidentalis caurina*) are addressed in the Biological Assessment for this project.

It is FS policy to protect the habitat of federally listed and FS listed sensitive species from adverse modification or destruction, as well as to protect individual organisms from harm or harassment as appropriate on FS lands (FSM 2670.3). This BE assesses possible impacts the proposed project may have on FS-sensitive and management indicator species of wildlife, fish, and invertebrate species and their associated habitats that may occur on the Mt. Hood National Forest.

2 PROJECT LOCATION

The project area is located approximately four miles south of Government Camp and US Highway 26, in Section 2, Township 4 South, Range 8½ East, Willamette Meridian, Clackamas County, Oregon. The Tamarack Quarry is approximately 1.5 miles south of Trillium Lake. Figure 1 shows the project area and location.

The project area encompasses approximately 48 acres adjacent to (generally north and east of) the existing Tamarack Quarry. The existing quarry occupies approximately 22 acres. The project area also includes a corridor, approximately 3.1 miles long, along the existing haul route to the quarry from Highway 26. The haul route is along FS roads 2656 and 2656-955. References in this document to the "expansion area" are meant to only address the quarry expansion and not the haul route, whereas references to the "project area" includes the area described above.

3 PROPOSED ACTION

The proposed action is to expand the existing Tamarack Quarry (formerly known as the Mud Creek Quarry) to encompass up to 70 acres of National Forest System land. Rock would be excavated from the existing quarry and the expansion area. The excavated material would be used by ODOT and the FS for road maintenance and construction,

including improvements to US 26 and Oregon Route (OR) 35. Other uses may include road closures and site restoration, such as stream projects.

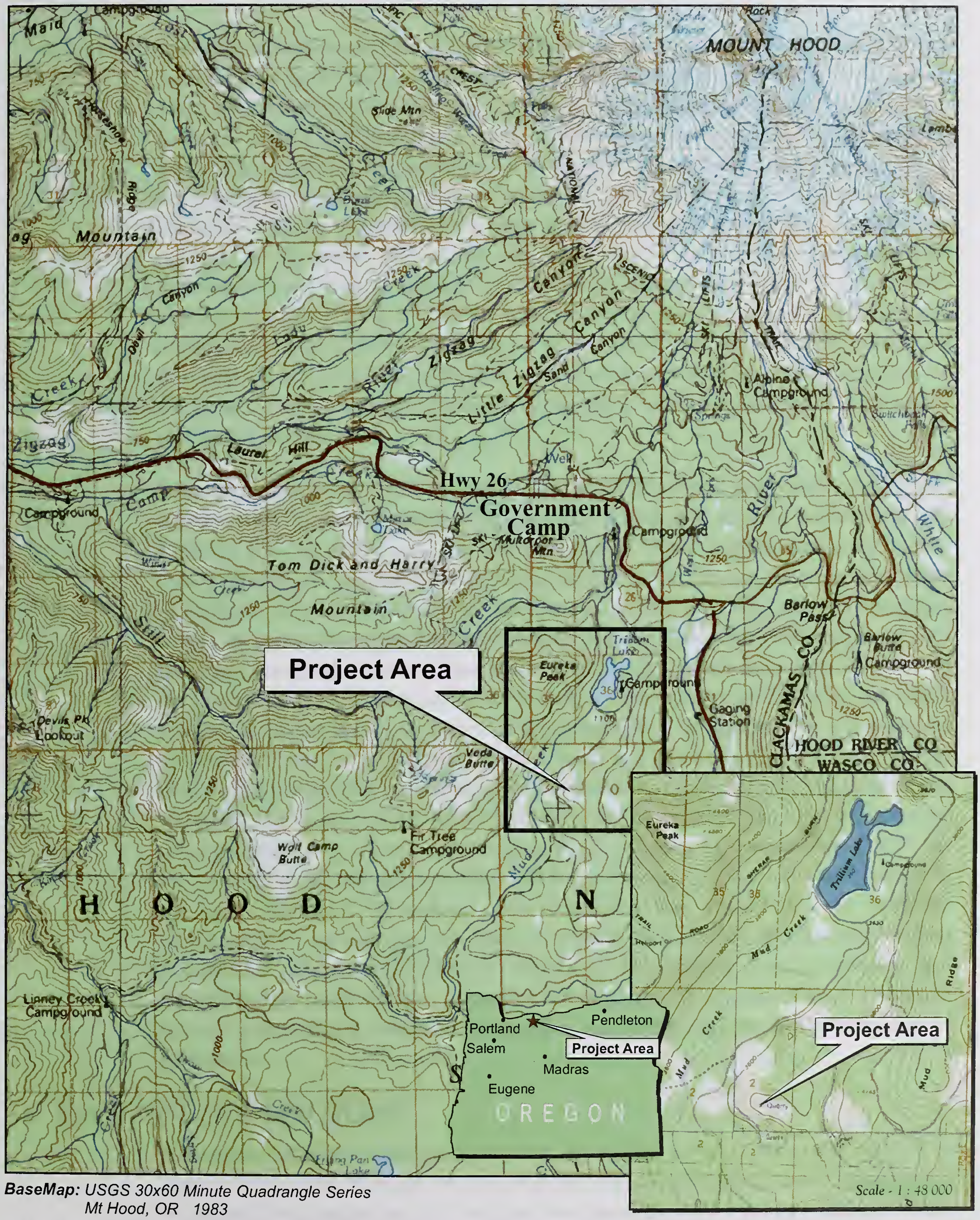
Vegetation removal and rock excavation would occur over the next 20 years, as rock is needed. ODOT anticipates removing 40,000 to 100,000 cubic yards of rock per year, although needs would vary with annual road and weather conditions. The FS would extract less than 10,000 cubic yards of rock per year for project work other than emergencies. ODOT and the FS would extract rock from the remaining seven acres within the current permitted area prior to entering the expansion area.

The existing quarry is surrounded by talus slopes and Douglas-fir-dominated, second-growth forest, although there are scattered late-seral remnant trees with mature snags and large down woody debris to the north. Other species in the tree layer include western hemlock, western red cedar, and western white pine. The shrub layer is dominated by Pacific rhododendron and dwarf oceanspray. The expansion area is classified as Matrix land in the LRMP. All existing vegetation in the expansion area would be removed for quarry operations.

Activities would include clearing vegetation, blasting, rock crushing, screening, batching, loading and hauling, importing excess materials (such as from slides and ditch cleanings) for reprocessing or quarry reclamation, and short-term stockpiling of excavated rock and soils. Materials would be stockpiled on-site either for reprocessing or for use in reclamation. Rock for sanding roads would be hauled out of the quarry and stockpiled at various locations: the junction of US 26 and OR 35, the Government Camp maintenance station, Bennett Pass, Parkdale, and the junction of OR 216 and US 26. Construction rock would be quarried as needed and used shortly after crushing.

Activities would be subject to timing restrictions. Blasting would be allowed after July 15 only. No noise-generating or hauling activities would occur at night, on weekends, during holidays, or any time between the first measurable snowfall and mid-April, except for emergencies. ODOT would be responsible for plowing two lanes with turnouts on the haul route, as needed, as early as the second full week of April. Typically the FS opens the road a week or two prior to Memorial Day weekend.

The haul route from its junction with US 26 to the quarry is approximately 3.1 miles long, entirely on National Forest System lands, and includes FS roads 2656 and 2656-955. FS road 2656 is surfaced with asphalt. FS spur road 955 is gravel surfaced. No improvements would be made to the haul route except for routine maintenance, which may include resurfacing, structural repairs, striping, placement of safety reflectors, and placement of additional traffic signs. ODOT would pay for a commensurate portion of haul route maintenance. Traffic control, which may include flaggers and signs, would be implemented during hauling. Typical hauling trucks have a 20-cubic-yard capacity. No culvert replacements, road widening, pull-out or turn-around construction would occur as part of the proposed action.



BaseMap: *USGS 30x60 Minute Quadrangle Series*
Mt Hood, OR 1983

Inset Map: *USGS 7.5 Minute Quadrangle Series*
Mt Hood South, OR 1980; Government Camp, OR 1980;
Wolf Peak, OR 1985; Wapinitia Pass, OR 1985

Figure 1
Vicinity

Scale - 1 : 100 000

A FS geologist estimated the remaining volume of good quality rock to be at least two million cubic yards. The geologist estimated the volume of the remaining in-place rock based on the topographic information from a 1"=100' site map, the location of surface outcrops, limited drill hole information, an assumption that good quality rock extends north beyond the drill hole locations for about 250 feet, and allowing for 20 percent of the volume to be soil and poor quality rock. The basic assumption is that the spur ridge landform is mostly underlain by the same andesite rock unit. Due to the extensive rock outcrops on the south side of the spur ridge there was little need for subsurface exploration until plans developed to excavate an upper bench. The FS drilled three exploratory holes in 1978. These drill holes are located approximately 150 feet northeast of the present quarry development limit. The drill holes were approximately 120 to 200 feet deep and indicated there is 180 feet or more of good quality rock below about 6 to 20 feet of soil. Additional drilling would be completed to verify the presence of good quality rock before expansion.

Detailed excavation and reclamation plans would be developed, approved by the FS, and implemented as expansion occurs. A reclamation plan is a required condition of any approved plan of operations. The reclamation plan would provide details about how ODOT expects to accomplish reclamation objectives. A diagram showing how waste rock will be arranged in the mine and the final grade of the reclaimed area is a mandatory part of the reclamation plan. Reclamation would include filling and stabilizing the quarry, spreading waste rock across the quarried area, adding any topsoil and vegetation removed during excavation, and planting native vegetation. Overburden soil has been and would continue to be saved for use during later reclamation of the quarry. The soil would be pushed back into the quarry benches and floors and planted with erosion-preventing, native grasses and other vegetation when the excavation is completed. The slope of the reclaimed quarry area would be between zero and ten percent. Portions of the quarry could be reclaimed in stages, depending on the final quarry excavation plan. ODOT has the option of hiring specialists to help with the revegetation portion of the reclamation or providing funding for FS assistance. The reclamation plan would follow the water and erosion control, soil salvage and replacement, and land shaping and revegetation best management practices described in the DOGAMI Mineral Land Regulation and Reclamation Program's manual aggregate mines (Open-File Report O-96-2). DOGAMI requires a reclamation plan to be submitted as part of the Division 30 Operating Permit application.

4 EXISTING CONDITIONS

Vegetation within the project area is within the Pacific Silver Fir Zone (USDA, 1982). Remnant old growth Douglas fir *(Pseudotsuga menziesii)* trees are scattered throughout the proposed expansion area and comprise what remains of the overstory canopy. Pacific silver fir *(Abies amabilis),* western hemlock *(Tsuga heterophyla*), mountain hemlock (*Tsuga mertensiana*) and western red cedar *(Thuja plicata)* occur in the midstory and understory within this area. Pacific rhododendron *(Rhododendron macrophyllum)*

dominates most of the expansion area, with scattered areas dominated by huckleberry (*Vaccinium* spp.). The herb layer is sparse, with bear-grass (*Xerophyllum tenex*) as the dominant herb. There is a high density of down woody debris and snags within the proposed expansion area.

The Salmon River watershed provides potential habitat for more than 230 species of wildlife. The watershed also provides special habitats including wetlands, rock outcrops, talus slopes, cliffs and waterfalls (USDA, 1995). Vegetation in the watershed was classified into stand structure classes for the Salmon River Watershed Analysis. Structure classifications were based on tree size and canopy closure. Two levels of structural categories were used in this analysis:

- Coarse level split into Open, Small Conifer, and Large Conifer.
- Finer breaks based primarily on canopy closure within these three classes.

Open: Vegetated areas that currently function as openings. These include:

- Grass/forb/shrub (GFS) (including grass/forb/shrub/advanced): Dominated by early seral vegetation and tree seedlings with less than 40 percent total tree canopy cover.
- Open Sapling/Pole (OSP): sapling and pole size trees dominate (less than 9 inches dbh) and canopy cover is 70 percent or less. Shrubs may be well established.

Small Conifer: Stands that have tree canopy closure over 40 percent and are dominated by tree sizes between 9 and 21 inches dbh, or sapling/pole stands over 70 percent closure. These stands include:

- Closed Sapling Pole (CSP): trees up to 9 inches dbh dominate the stand; canopy closure is greater than 70 percent. Early-seral understory vegetation begins to decline .
- Open Small Conifer (OSC): trees 9 to 21 inches dbh dominate the stand; canopy closure is 70 percent or less.
- Closed Small Conifer (CSC): trees 9 to 21 inches dbh dominate the stand; canopy cover is over 70 percent. A range of stands are represented—from dense young single-story stands with little understory vegetation to older stands with multiple layered canopies.

Large Conifer: Stands that have tree canopy closure of 40 percent or more and are dominated by trees greater than 21 inches in diameter. These stands include:

- Open Large Conifer (OLC): trees over 21 inches dbh dominate the stand, and canopy cover is 50 percent or less.

- Closed Large Conifer (CLC): trees over 21 inches dbh dominate the stand and canopy cover is over 50 percent.

Over 50 percent of the expansion area is composed of GFS stands with the remaining 50 percent of the expansion area are in the CSC structure stage. Within the CSC stands remnant late seral Douglas-fir and western hemlock trees occur. A majority of these trees are snags in various states of decay.

5 METHODS

A pre-field review of existing information and references for federally listed species was conducted for the project area. The Mt. Hood National Forest provided a list of the federally listed wildlife and fish species that could potentially occur in the project area. Habitat conditions for threatened and endangered species were evaluated in the expansion area on November 14, 2002. No surveys for threatened or endangered species were conducted for this project; however, several surveys have been conducted for species listed as "survey and manage" under the Northwest Forest Plan. Surveys were conducted in accordance with the 2001 Survey and Manage ROD on November 14, 2002; May 27, 2003; and October 10, 2003.

6 ENVIRONMENTAL CONSEQUENCES

6.1 THREATENED AND ENDANGERED SPECIES

6.1.1 Bald Eagle

6.1.1.1 Status

Bald eagles are federally listed as threatened by the USFWS (32 FR 4001). The species is currently being considered for de-listing from the federal list of endangered and threatened wildlife (60 FR 36010).

6.1.1.2 Life History and Habitat Requirements

The bald eagle is found along the shores of saltwater and freshwater lakes and rivers. Breeding territories are located in predominately coniferous, uneven-aged stands with old-growth components (Anthony et al., 1982). However, they may also be located within mature deciduous stands in association with water. Territory size and configuration are influenced by a variety of habitat characteristics, including availability and location of perch trees for foraging, quality of foraging habitat, and distance of nests from waters supporting adequate food supplies. Habitat models for nesting bald eagles show that eagles select areas with suitable forest structure, low human disturbance, and highly diverse or accessible prey (Livingston et al., 1990).

In Oregon, bald eagle nests are typically within one mile of water (Marshall et al 2003). Bald eagles typically build large stick nests in mature or old growth trees, which are generally used over successive years. A typical nest tree is dominant or co-dominant in

the overstory, and is usually live, but often has a dead or broken top with a limb structure to support the nest (Rodrick and Milner, 1991). The nest tree usually has an unobstructed view of nearby water, and has stout upper branches that form flight windows large enough to accommodate the bird's large wingspan (Grubb, 1976). The three main factors affecting distribution of nests and territories are proximity to water and availability of food, suitable trees for nesting, perching, and roosting, and the number of breeding-aged eagles (Stalmaster et al., 1985).

Wintering bald eagles concentrate in areas where food is abundant and disturbance is minimal. The birds use perches during the day, which are selected primarily according to their proximity to a food source (USFWS, 1986). Wintering bald eagles may roost communally at night near major foraging areas. Roosts typically are established in isolated areas in old growth stands that have trees taller than the surrounding trees.

Sufficient, consistent, accessible, and uncontaminated food resources may be the most critical components of winter and breeding habitat for bald eagles (USFWS, 1986; Stalmaster et al., 1985). Since eagles often depend on dead or weakened prey, their diet may vary locally and seasonally. Various carrion, including spawned salmon taken from gravel bars along wide, braided river stretches, are important food items during the fall and winter (Stalmaster et al., 1985). Waterfowl are taken as well, especially near hunting areas where crippled and dead birds occur. Anadromous and warm-water fishes, small mammals, carrion, and seabirds are consumed during the breeding season (USFWS, 1986, Anderson et al., 1986).

Critical nesting periods for the bald eagle are between January 1 and August 15. Key wintering periods are from November 15 to March 15.

6.1.1.3 Distribution and Occurrence in Project Area

Bald eagles are found throughout the state during the non-breeding season and may occur in the project area during this period. Bald eagles are uncommon to rare breeders outside their primary breeding areas in Oregon. The closest breeding area is along the Columbia River below Portland (Marshall et al., 2003). There are no known bald eagle nests within one mile of the project area (Isaacs, 2003; Isaacs, pers. comm., 2003).

Winter use of the project area is unlikely since bald eagles congregate in areas of abundant forage and low human disturbance. Due to the elevation of the lake (3601 feet), Trillium Lake may freeze during the winter, limiting forage opportunities. The recreational use within the project vicinity is high, which would further limit bald eagle use of this area.

6.1.1.4 Existing Habitat Conditions

In Oregon, bald eagle nests are generally located within one mile of water (Marshall et al., 2003). Trillium Lake is located over a mile north of the quarry and could provide bald

eagle nesting and foraging habitat. The lake is seasonally stocked with fish but may not provide a consistent prey base. The proposed quarry expansion area would not provide suitable nesting habitat for bald eagles. Because the lake freezes in the winter, the project area would not support wintering bald eagles.

6.1.1.5 Analysis of Project Impacts

The proposed project would not remove bald eagle nesting, winter roosting or foraging habitat.

Although bald eagles may migrate through the project area, suitable habitat for winter concentrations is lacking because the lake freezes over in the winter, blocking access to the prey base. As stated in the analysis for spotted owls, there will be infrequent noise above local ambient levels; but with no evidence of nesting activity at the lake, it can be assumed that the project will not have direct, indirect, or cumulative impacts to non-breeding bald eagles.

6.1.1.6 Determination of Effect

Based on the analysis of survey data for eagle occurrence at the lake and the lack of breeding activity, it is determined that the project will have **no effect** on bald eagles.

6.1.2 Canada Lynx

6.1.2.1 Status

The Canada lynx is a federally threatened species in the contiguous US distinct population segment (March 24, 2000, 65 FR 16051). This population segment includes the forested portions of 13 states, of which Oregon and Washington are included.

6.1.2.2 Life History and Habitat Requirements

In the southern portion of their North American range, lynx are associated with boreal forests typically found in higher elevations of montane regions (Whitmer et al., 1998). Lynx habitat west of the Cascades has been described as occurring in a dominant potential vegetation type of subalpine fir forest (Pengeroth, 2001). A common component of natal denning habitat appears to be large woody debris, either down logs or root wads. Den sites may be located in regeneration stands older than 20 years or in mature conifer or mixed conifer/deciduous forests (USDA and USDI, 1999). Lynx require a mosaic of forest seral stages connected by forested stands suitable for travel cover. Foraging habitat is usually near den sites. Home range sizes of lynx are quite variable. Generally, home range sizes at the southern extent of lynx range are larger than in northern boreal forest, due to lower prey densities and inherent habitat patchiness. Studies in Washington and Montana found home range sizes from 27 to 47 square miles (mi^2) for males, and from 15 to 17 mi^2 for females. Large home range sizes indicate that lynx were required to travel extensively to locate sufficient prey resources (USDA and USDI, 1999). Lynx are highly

dependent on snowshoe hares *(Lepus americanus)* and Douglas squirrel *(Tamiasciurus douglasii)* as prey, especially during the winter (Whitmer et al., 1998).

6.1.2.3 Distribution and Occurrence within the Project Area

The Mt. Hood National Forest issued a Lynx Effects Determination letter on December 3, 2003 (Dyck, 2003). The following is cited in that determination letter. The USFWS published the following conclusions about lynx in Oregon. "There is no evidence that a lynx population ever occurred in Oregon (Verts and Carraway 1998; K. McKelvey and K. Aubry, Rocky Mountain Research Station, in litt. 2001). Only 12 verified records of lynx exist for Oregon for the past century (Verts and Carraway 1998, McKelvey et al. 200b). The majority of these records are from marginal or non-lynx habitats and correlate with cyclic highs in northern lynx populations (Verts and Carraway 1998; K. McKelvey and K. Aubry, Rocky Mountain Research Station, in litt. 2001). We do not consider compilations of anecdotal reports of lynx in Oregon reliable for the reasons described by McKelvey and Aubry (Rocky Mountain Research Station, in litt. 2001). Habitats in Oregon that are potentially suitable for lynx are naturally isolated from occupied habitats in Washington and Idaho. There are no records of lynx reproduction in Oregon. Based on the limited verified records of lynx, lack of evidence of lynx reproduction, frequency of occurrences in atypical habitat , and the correlations of such occurrences with cyclic highs, we believe that lynx occur in Oregon as dispersers that have never maintained resident populations"(Federal Register Volume 68, pp 40089-40090, July 3, 2003).

6.1.2.4 Existing Habitat Conditions

The Forest currently has no mapped lynx habitat. In January 2001 Standards and Guidelines for the management of lynx were addressed in the Final Environmental Impact Statement (FEIS) and Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (2001 Survey and Manage ROD) (USDA and USDI, 2001). This FEIS and Survey and Manage ROD amended the Northwest Forest Plan and therefore the LRMP. The Northwest Forest Plan Standards and Guidelines direct that the Lynx Conservation and Assessment Agreement (LCAS) (Ruediger et al., 2000, as cited in Dyck, 2003) will be used and referenced in all determinations of effect for Canada lynx. Lynx habitat as described in the LCAS and subsequent interpretation is not expected to occur on the Mt. Hood National Forest. The LCAS identified subalpine fir plant associations as the primary vegetation component from which lynx habitat and lynx analysis units would be delineated. The FS ran this analysis based on plant association groups and identified approximately 1,270 acres of subalpine fir plant associations primarily on the east side of the Forest.

The LCAS identified a need for at least 10 square miles (6,400 acres) of primary vegetation to warrant delineation of a lynx analysis unit. "Based on studies at the southern part of the lynx range in western U.S., it appears that at least 10 mi^2 of primary

vegetation should be present within each LAU to support survival and reproduction" (Ruediger et al., 2000, as cited in Dyck, 2003). The Mt. Hood National Forest does not have the minimum criteria to develop a lynx analysis unit. Therefore there is no mapped lynx habitat on the Forest or any lynx analysis units within which to apply the LCAS habitat objectives (Dyck, 2003).

6.1.2.5 Analysis of Project Impacts

There is no suitable lynx habitat within the project area or the Mt. Hood National Forest. Winter tracking surveys have been conducted on the Forest during the winters of 1994/1995 and 1995/1996 and again in 2000 (USDA, 1995 and USDA, 1995/1996). No lynx were detected during these surveys. In addition, "Cascadia Wild!" in partnership with the Forest conducted snow tracking surveys in areas around Mt. Hood and did not detect any lynx tracks. The Forest has implemented the National Lynx Survey Protocol from 1998 through 2001. There were no verified lynx hair samples.

6.1.2.6 Determination of Effects

Since there is no lynx habitat and no presence of lynx within the project area or the Mt. Hood National Forest the proposed project will have **no effect** on the Canada lynx.

6.1.3 Fish

The closest stream to the Tamarack Quarry is Mud Creek, which is approximately 0.4 mile away. Mud Creek is a tributary to the Salmon River that has a natural anadromous fish barrier approximately 9 miles downstream of Trillium Lake. Because anadromous fish cannot access the project area and closest stream is over 0.4 mile from the quarry, the proposed project would have **no effect** on Lower Columbia coho, chinook, and steelhead Evolutionarily Significant Units and their ESA listed critical habitat found in the lower reaches of the watershed. There are no intermittent or perennial channels in the expansion area. There is no hydrologic connection between the project area and Mud Creek. The Soil and Water Technical Report has a detailed discussion of surface water and hydrology. The checklist for *Documenting Environmental Baseline and Effects of Proposed Action(s) on Relevant Indicators* used by the National Marine Fisheries Service (NOAA Fisheries) was not prepared for this project because there will be no change from baseline conditions of the Mud Creek catchment and Salmon River due to the implementation of this project.

Bull trout may have historically occurred in the Salmon River watershed, but its presence has not been confirmed. Suitable habitat and isolation exists to support this species in the upper watershed (USDA, 1995). Since the closest potential bull trout habitat is 0.4 mile from the project area the proposed project would have **no effect** on this species.

6.2 ESSENTIAL FISH HABITAT CONSULTATION

Public Law 104-267, the Sustainable Fisheries Act of 1996, amended the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to establish new requirements for "Essential Fish Habitat" (EFH) descriptions in federal fishery management plans and to require federal agencies to consult with NOAA Fisheries on activities that may adversely affect EFH. "Essential Fish Habitat" means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (Magnuson-Stevens Act). The Pacific Fisheries Management Council (PFMC) has recommended an EFH designation for the Pacific salmon fishery that would include those waters and substrate necessary to ensure the production needed to support a long-term sustainable fishery (i.e., properly functioning habitat conditions necessary for the long-term survival of the species through the full range of environmental variation).

The Magnuson-Stevens Act requires consultation for all actions that may adversely affect EFH, and it does not distinguish between actions in EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities that may have an adverse effect on EFH. Therefore, EFH consultation with NOAA Fisheries is required by federal agencies undertaking, permitting, or funding activities that may adversely affect EFH, regardless of its location.

6.2.1 Identification of Essential Fish Habitat

Salmon fishery EFH includes all those streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon in Washington, Oregon, Idaho, and California, except above the impassable barriers identified by PFMC (PFMC, 2000). Chief Joseph Dam, Dworshak Dam, and the Hells Canyon Complex (Hells Canyon, Oxbow, and Brownlee Dams) are among the listed manmade barriers that represent the upstream extent of the pacific salmon fishery EFH. Salmon EFH excludes areas upstream of longstanding naturally impassable barriers (i.e., natural waterfalls in existence for several hundred years) (PFMC, 2000).

6.2.2 Conclusion

Mud Creek is upstream of longstanding naturally impassable barrier, and therefore the project area is excluded from EFH.

6.3 FOREST SENSITIVE SPECIES

6.3.1 Wildlife

There are 16 wildlife species on the Regional Forester's Sensitive Species List for the Mt. Hood National Forest. The wildlife species, their habitat associations, and suitable habitat within the project area are listed in Table 1.

Table 1. Effect Determination for Wildlife Species

Species	Alternative 1	Alternative 2	No Action
Threatened and Endangered Species:			
Bald eagle	No Effect	No Effect	No Effect
Northern spotted owl	MA-NLTAA	MA-NLTAA	MA-NLTAA
Canada lynx	No Effect	No Effect	No Effect
R6 Sensitive Species (selected species – see Table 2):			
Larch Mountain salamander	No Impact	No Impact	No Impact
Oregon slender salamander	No Impact	No Impact	No Impact
Pacific fringe-tailed bat	No Impact	No Impact	No Impact
Wolverine	No Impact	No Impact	No Impact
Pacific fisher	No Impact	No Impact	No Impact

MA-NLTAA = may affect-not likely to adversely affect

Table 2. Forest Service Sensitive Wildlife Species

Species	Habitat Requirements	Suitable Habitat In Project Area?
Baird's shrew (*Sorex bairdii permiliensis*)	Found in moist, cool areas within coniferous or deciduous forests especially damp meadows, mossy banks of small streams, marshes, and sphagnum bogs.	No suitable habitat in project area.
California wolverine (*Gulo gulo*)	Remote high elevation mixed coniferous forest with shale or rockslide areas.	No suitable habitat in project area.
Pacific fringe-tailed bat (*Myotis thysanodes vespertinus*)	Roosts and/or breeds in forest/riparian areas, caves, mines, and abandoned buildings. Forages along edges of open water, roads, and in forest openings.	Species has not been documented on the Mt. Hood NF.
Pacific fisher (*Martes pennanti*)	Inhabits mature, closed canopy, dense coniferous and mixed coniferous/deciduous forests along riparian corridors.	Although no riparian corridor, dense snags and down wood may provide habitat.
Harlequin duck (*Histrionicus histrionicus*)	Clear, clean, swiftly flowing second to fifth order streams.	No suitable habitat in project area.
Peregrine falcon (*Falco peregrinus*)	Nest on cliffs near large concentrations of waterfowl or flocking birds.	No suitable nesting or foraging habitat in project area.
Horned grebe (*Podiceps auritus*)	Inhabits areas with open water surrounded with emergent vegetation. Nests in inland marshes and winters in the shallow waters of the coast.	No suitable habitat in project area.
Bufflehead (*Bucephala albeola*)	Inhabits and nests near mountain lakes surrounded by forests containing snags. Preferred nesting trees are aspen, also nest in ponderosa pine or Douglas-fir. After breeding season, found in open water, along major rivers, and along the coast.	No suitable habitat in project area.
Gray flycatcher (*Empidonax wrightii*)	Found east of the Cascades in the arid interior of tall sagebrush, bitterbrush, and mountain mahogany.	No suitable habitat in project area.
Painted turtle (*Chrysemys picta*)	Inhabits quite, shallow waters of lakes, rivers, or streams, with a muddy or sandy substrate. They require basking sites and aquatic vegetation at the water edge.	No suitable habitat in project area.
Northwest pond turtle (*Emys marmorata marmorata*)	Marshes, sloughs, moderately deep ponds, and slow-moving portions of creeks and rivers.	No suitable habitat in project area.
Spotted frog (*Rana pretiosa*)	Waters with vegetated shorelines; slow flowing streams with decaying vegetation on the bottom.	No suitable habitat in project area.
Cope's giant salamander (*Dicamptodon copei*)	Clear, fast flowing streams or ponds with gravel bottoms in moist coniferous forests.	No suitable habitat in project area.
Larch Mountain salamander (*Plethodon larselli*)	Frequently found in talus slopes in forested areas or steep slopes in old growth forest but can occupy other substrates.	Marginal habitat may be present in project area. Survey conducted; no individuals detected.
Oregon slender salamander (*Batrachoseps wrighti*)	Found under bark or moss in mature and second-growth Douglas-fir forests, under rocks or logs in stand of moist hardwood forests, and in moist talus that has abundant woody debris.	Suitable habitat in project area. Habitat surveyed while conducting Larch Mtn. salamander surveys. No individuals detected.

Species	Habitat Requirements	Suitable Habitat In Project Area?
Cascade torrent salamander (*Rhyacotriton cascadae*)	Usually found on stones or objects in or near water or on overhanging vegetation. Forages on aquatic insects.	No suitable habitat in project area.

Source: Corkran et. al, 1996; Csuti et. al, 1997.

6.3.1.1 Analysis of Project Impacts

Timber removal would occur in the expansion area but the rate of the removal would occur slowly over 20-year period. No specific expansion plans have been developed, as the expansion would occur as needed. The stands within the expansion area are predominantly open canopy, early seral habitats. The removal of these stands and other structural stage classes present in the expansion area comprise less than a one percent reduction of each of these structures within the watershed. For example, 28,069 acres of the watershed are stands classified as closed small conifer structure class. Alternative 1 would remove only seven acres of this stand structure and Alternative 2 would not remove any stands within this stage class. No late seral structural classes occur in the expansion area.

The expansion area contains mature, remnant (over 21 in dbh) snags and downed logs. The Salmon River Watershed Analysis states that snag density in the watershed is low overall due to past high intensity fires and past management practices (USDA, 1995). Snag density is low in the Mud Creek catchment, however the subwatersheds adjacent to the expansion area (East and West Forks and Upper Salmon River) have a high density of large snags.

Both Alternatives 1 and 2 would remove snag and large down woody debris habitat in the expansion area that may impact sensitive species such as the Pacific fringe-tailed bat and the Pacific fisher. Higher quality habitat for wolverine and fisher occur in the adjacent East and West Forks subwatershed and in the Mt. Hood Wilderness in general. Potential suitable habitat exists in the expansion area for the Larch Mountain salamander, and Oregon slender salamander. Surveys were conducted for these species to FS protocol, and no individuals were located. The implementation of either Action Alternative would remove habitat for these species. This loss of habitat is offset by higher quality adjacent habitat outside of the expansion area and Matrix land allocations. This adjacent habitat in protected wilderness areas and meadow complexes is expected to provide the primary suitable habitat for listed wildlife species.

6.3.2 Fish

The closest stream to the Tamarack Quarry is Mud Creek, which is approximately 0.4 miles away. Mud Creek, a tributary to the Salmon River, has a natural anadromous fish barrier approximately 9 miles downstream of Trillium Lake. There are no intermittent or perennial channels in the expansion area. There is no hydrologic connection between the

project area and Mud Creek. The Soil and Water Technical Report has a detailed discussion of surface water and hydrology.

The only fish species on the Regional Forester's sensitive species list that is suspected to occur in the Salmon River watershed is the interior redband trout (USDA, 1995). Its closest potential habitat is over 0.4 miles from the quarry. The proposed project is expected to have **no impact** on the interior redband trout or anadromous salmonids defined in the Mt. Hood LRMP as management indicator species.

Riparian Reserves, as outlined in the Northwest Forest Plan, provide an area along all streams, wetlands, ponds, lakes, reservoirs, and unstable and potentially unstable areas where riparian-dependent resources receive primary emphasis. Riparian Reserves are also important to the terrestrial ecosystem, providing habitat within the riparian upland/transition zone, as well as providing connectivity within the watershed and among Late-Successional Reserves (USDA and USDI, 1994). The expansion area is not located within riparian reserves designated by the Northwest Forest Plan.

7 CONSERVATION MEASURES

- Blasting and quarry operations (including hauling) will be limited to daylight hours.
- Mufflers will be placed on equipment during operation to minimize noise.
- A blasting plan and quarry operation plan will be developed that outlines the hours of operations, blasting times.
- Refer to the Soil and Water report for erosion control measures.
- A reclamation plan will be developed and native vegetation will be used.

8 INTERRELATED, INTERDEPENDENT, AND CUMULATIVE IMPACTS

Secondary impacts include interrelated projects that have no independent utility apart from the proposed action, and interdependent projects that are a part of a larger action and depend on the larger action for justification. Cumulative impacts are defined as those impacts that "result from the incremental consequences of an action when added to other past and reasonably foreseeable future actions" (40 CFR 1508.7). The cumulative effects of an action may be undetectable when viewed in the individual context of direct and even secondary impacts, but can nonetheless add to other disturbances and eventually lead to a measurable environmental change.

Future Federal actions are subject to the consultation requirements established in section 7 of the ESA, and therefore are not considered cumulative in the proposed action. There were no known significant non-Federal projects occurring near the project area or within the watershed that were available for the analysis of secondary or cumulative impacts. It

is anticipated that this project, even in combination with Federal projects, will not have a significant impact on Forest Service sensitive species.

9 CONCLUSION

Based on field investigations, review of literature and data, and conversations with FS staff, the following determinations were made:

- The proposed project would have ***no effect*** on:
  - **Canada Lynx**
  - **Bald eagle**
  - **Lower Columbia River coho, chinook and steelhead Evolutionarily Significant Units and their ESA listed critical habitats**
  - **Bull trout**

Based on field investigations and review of literature and data, the proposed project would result in the loss of up to 52 acres of potential habitat for the California wolverine, Pacific fringe-tailed bat, Pacific fisher, Larch Mountain salamander, and Oregon slender salamander. The project **will not impact the interior redband trout**.

10 SURVEY AND MANAGE AND WILDLIFE REPORT

This section addresses species classified as survey and manage species in the Record of Decision for Amendments to the Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (USDA and USDI, 1994) and those species classified as management indicator species in the LRMP for the Mt. Hood National Forest (USDA, 1990).

A portion of the Northwest Forest Plan was modified by the Survey and Manage ROD (USDA and USDI, 2004a). The Survey and Manage ROD removed the Survey and Manage Mitigation Standards and Guidelines, replacing them with Special Status Species Policies. Under those policies, pre-project clearances must be completed prior to habitat-disturbing activities to determine the presence of special status (i.e., FS sensitive) species or their habitat. However this ROD has been set aside as a result of a court action in January 2006 and the 2001 Survey and Manage ROD has been reinstated.

The surveys were conducted prior to the 2004 modification of the survey and manage direction and in accordance with the 2001 Survey and Manage ROD.

SURVEY AND MANAGE SPECIES

There are 14 species that may occur in or near the expansion area that are classified as survey and manage species in the 2001 Survey and Manage ROD (USDA and USDI, 2001). Table 3 lists the terrestrial survey and manage species that may occur on the

Zigzag Ranger District, their habitat associations, their potential to occur within the expansion area, and whether surveys for them would be required prior to project implementation. There is no suitable habitat for aquatic survey and manage species within the expansion area, and no surveys are required.

Table 3. Survey and Manage Species on the Zigzag Ranger District

Species	Habitat Association	Potential to occur and survey requirements
Puget oregonian (*Cryptomastix devia*)	Low to mid-elevations mature to late-successional moist forests and riparian areas; in leaf litter and/or talus; big leaf maple and sword fern common; high canopy cover.	No suitable habitat since project high elevation and lacks leaf litter; no surveys were conducted.
Oregon megomphix (*Megomphix hemphilli*)	Moist conifer or hardwood forest up to 3,000 feet in elevation; big leaf maple and sword fern on forested slopes and terraces; moist leaf litter.	Project above 3,800 feet, no suitable habitat. No surveys conducted.
Crater lake tightcoil (*Pristiloma arcticum crateris)*	Moist conifer forests above 2,000 feet elevation; among mosses and other vegetation near wetlands, springs, seeps, and riparian areas.	No wetlands, seeps or riparian areas present in the expansion area; no surveys were conducted.
Evening fieldslug (*Derocerus hesperium*)	Low to mid-elevations from the western slopes of the Cascades to the Pacific; may be associated with a variety of low vegetation, litter, and debris.	Marginal habitat is present in the expansion area; surveys were conducted-species not present.
Warty jumping-slug (*Hemphillia glandulosa*)	Confer logs and/or heavy ground cover of low vegetation, litter, and debris in moist conifer forests	Suitable habitat is present in the expansion area; surveys were conducted-species not present.
Larch Mountain salamander (*Plethodon larselli)*	Frequently found in talus slopes in forested areas or steep slopes in old growth forest but can occupy other substrates.	Marginal habitat is present in the expansion area; surveys were conducted-species not present.
Silver-haired bat (*Lasionycteris noctivagans),* fringed myotis (*Myotis thysanoides),* long-eared myotis (*M. evotis*), and long-legged myotis (*M. volans)*	Protection buffer species in matrix and adaptive management area land allocations where surveys are required. For other land allocations, surveys in suitable habitat recommended.	Snags in expansion area could provide roosting habitat for these species. No surveys are required.
Oregon red tree vole (*Arborimus longicaudus)*	Coniferous forests particularly old growth up to 6,000 feet in elevation.	Open canopy and low density of Douglas-fir trees does not provide habitat for this species. No surveys are required.

*Source: USDI, 1999, 2001. * Also on the Regional Forester's Sensitive Species list*

10.1.1.1 Terrestrial Mollusks

DEA completed a pre-disturbance terrestrial mollusk inventory to FS regional protocol standards for the project. The only mollusk species found during the surveys was the Malone jumping slug (*Hemphillia malonei*), which is no longer a survey and manage

species. The high level of down woody debris within the proposed expansion provides habitat for this species.

10.1.1.2 Bat Species

The old-growth forest within the expansion area provides roosting and foraging habitat for silver-haired bat, fringed myotis, long-eared myotis, and long-legged myotis. Depending on the preferred alternative selected, up to 52 acres of roosting and foraging habitat could be removed as part of this project. As the quarry expands, bats may not use the remaining day roosting habitat due to noise from quarry operations. Noise may also limit use of the surrounding habitat for day roost. Bats may continue to forage in the area since quarry operations would not occur during the evening.

10.2 MT. HOOD NATIONAL FOREST MANAGEMENT INDICATOR SPECIES

The following species are classified as management indicator species for the Mt. Hood National Forest: black-tailed deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), marten (*Martes americana*), and pileated woodpecker (*Dryocopus pileatus*). Potential impacts from the proposed project to these species are discussed below.

10.2.1.1 Deer and Elk

Elk utilize meadow areas and migrate elevationally by season. Black-tailed deer utilize brushy areas along forest edges, and adjacent early successional habitats (Csuti et al., 1997). Deer and elk occur within the vicinity of the project. High snow levels during the winter would deter use of the expansion area by both species. The expansion area provides suitable summer thermal cover habitat for both species. The project would remove up to 52 acres of thermal habitat, depending on the alternative selected. Noise from quarry operations may deter deer and elk use of the surrounding habitat within the project vicinity. Deer and elk habitat is not limited within the vicinity of the project. There is no suitable calving or fawning habitat within the expansion area, therefore no seasonal restrictions will be required.

10.2.1.2 Marten

Marten occupy forested habitats at all elevations, occasionally occurring in openings and alpine areas. Breeding habitat for marten is mature forest, with a significant large down wood component. Large diameter snags (greater than 21 inches) are an important habitat component for this species (Csuti et al., 1997). Martens have large home ranges, with female home range varying from 24 to 445 acres and male home range varying from 220 to 1,000 acres. The expansion area contains mature, remnant (over 21 in dbh) snags and downed logs. The Salmon River Watershed Analysis states that snag density in the watershed is low overall due to past high intensity fires and past management practices (USDA, 1995). Snag density is low in the Mud Creek catchment, however the catchment adjacent to the expansion area (East and West Forks and Upper Salmon River) have a high density of large snags. Depending on the alternative selected, the project could

remove up to 48 acres of habitat for this species. Noise from quarry operations may limit use of the surrounding habitat.

10.2.1.3 Pileated Woodpecker

Pileated woodpeckers inhabit old-growth and mature forests and second-growth forests with a significant snag and large down wood component (Rodrick and Milner, 1991). This species is dependent on large diameter trees with decay for nesting, roosting, and foraging (Marshall et al, 2003). This species has a large home range that can vary from 600 acres to over 2,000 acres (Marshall et al, 2003). The expansion area contains mature, remnant (over 21 in dbh) snags and downed logs. The Salmon River Watershed Analysis states that snag density in the watershed is low overall due to past high intensity fires and past management practices (USDA, 1995). Snag density is low in the Mud Creek catchment, however the catchment adjacent to the expansion area (East and West Forks and Upper Salmon River) have a high density of large snags. The expansion area provides high quality nesting, roosting, and foraging habitat for this species. During the field reconnaissance, evidence of pileated woodpecker use of the area was observed. Depending on the alternative selected, the project could remove up to 48 acres of habitat for this species. Noise from quarry operations may limit use of the surrounding habitat.

10.2.1.4 Salmonids

According to the Mt. Hood National Forest Plan standards and guidelines (FW-138), impacts on habitat for each fisheries management indicator species group (salmonids) shall be determined for each project affecting fisheries, in terms of habitat quality, quantity, and distribution (USDA, 1990). A natural fish barrier blocks access to the closest stream to the quarry. The project will not impact fish habitat quality, quantity or distribution.

11 CONSERVATION MEASURES FOR ALL SPECIES

- Blasting and quarry operations (including hauling) will be limited to daylight hours.
- Mufflers will be placed on equipment during operation to minimize noise.
- A blasting plan and quarry operation plan will be developed that outlines the hours of operations, blasting times.
- A reclamation plan will be developed and native vegetation will be used.

12 CONCLUSION

Based on field investigations, review of literature and data, the following determinations were made:

- The proposed project remove up to 48 acres of potential habitat for the wildlife management indicator species listed in the Mt. Hood Forest Plan. Implementation of the conservation measures will minimize noise disturbance to these species.

- The applicant will abide by all FS management recommendations for species discussed in this report.

13 PREPARERS AND CONTRIBUTORS

This report was written by Kristine Marshall, DEA Wildlife Biologist.

Preparer: Kristine Marshall, DEA Wildlife Biologist

DEA Reviewer: Dave Kennedy, DEA Wildlife Biologist

FS Reviewers:

/s/ Alan Dyck 1/12/06
Alan Dyck, Forest Wildlife Biologist

/s/ Duane Bishop 1/10/06
Duane Bishop, District Fisheries Biologist

/s/ Tracii Hickman 1/4/06
Tracii Hickman, Forest Fisheries Biologist

14 BIBLIOGRAPHY

Anderson, D.P., and M.V. Ichisaka. 1986. *Wintering ecology of bald eagles on the Lewis River, Washington, 1984-1986*. Pacific Power and Light.

Anthony, R.G., R.L. Knight, G.T. Allen, B.R McClelland, and J.I. Hodges. 1982. Habitat use by nesting and roosting bald eagles in the Pacific Northwest. *Trans. N. Am. Wildl. Nat. Res. Conf. 47*:332-342.

Corkran, C. C., and C. Thomas, 1996. *Amphibians of Oregon, Washington and British Columbia*. Lone Pine Publishing. Vancouver, B.C. Canada.

Csuti, B., A.J. Kimerling, T.A. O'Neil, M.M. Shaughnessy, E.P. Gaines, and M.M.P. Huso. 1997. *Atlas of Oregon wildlife*. Oregon State University Press. Corvallis, Oregon.

Dyck, Alan R. 2003 (December 3). "Lynx Effects Determination" Technical Memorandum to Wildlife Biologists, Mt. Hood National Forest. File Code 2670, Mt. Hood National Forest.

Grubb, T.G. 1976. *A survey and analysis of bald eagle nesting in western Washington*. M.S. Thesis, University of Washington, Seattle, Washington.

Isaacs, Frank, Oregon Cooperative Fish and Wildlife Research Unit, Oregon State University. 2003. Electronic database of bald eagle nest sites in Oregon.

Livingston, S.A., et al. 1990. Habitat models for nesting bald eagles in Maine. *J. Wildl. Manage. 54*(4):645-653.

Marshall, D.B., M.G., Hunter, and A.L. Contreras (editors). 2003. *Birds of Oregon*. Oregon State University Press, Corvallis, Oregon.

Pacific Fisheries Management Council (PFMC). 2000. Amendment 14 to the Pacific Coast Salmon Plan (1997), *Appendix A: Identification and Description of Essential Fish Habitat, Adverse Impacts, and Recommended Conservation Measures for Salmon*. Website: http://www.pcouncil.org/salmon/salfmp/a14.html.

Pengeroth, D. 2001. Lynx Effect Determination Memorandum. US Forest Service, Mt. Hood National Forest, August 2, 2001.

Rodrick, E., and R Milner (tech. editors). 1991. *Management recommendations for Washington's priority habitats and species*. Washington Department of Wildlife. Olympia, Washington.

Ruediger, Bill, J. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wegner, and A. Willliamson. 2000. Canada Lynx Conservation Assessment and Strategy. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management and USDI National Park Service. Forest Service Publication #R1-00-53, Missoula, MT.

Stalmaster, M.V., R.L. Knight, B.L. Holder, and R.J. Anderson. 1985. *Bald eagles*. Pages 269-290 in_E.R. Brown (ed.), *Management of wildlife and fish habitats in forests of western Oregon and Washington*. USDA Forest Service, USDI Bureau of Land Management.

USDA Forest Service, Mt. Hood and Willamette National Forests. 1982. *Plant Association and Management Guide for the Pacific Silver Fir Zone.*

USDA Forest Service 1990. *Land and Resource Management Plan.* Mt Hood National Forest.

USDA Forest Service 1995. *Salmon River Watershed Analysis: First Iteration.* Mt Hood National Forest.

USDA Forest Service. 1995. Mt. Hood National Forest 1995 Winter Tracking Report.

USDA Forest Service. 1995/1996. Forest Carnivore Tracking Report, Mt. Hood National Forest.

USDA Forest Service. 2001. Regional Forester's Sensitive List for the Mt Hood National Forest. US Forest Service, Pacific Northwest Region.

USDA Forest Service and USDI Bureau of Land Management. April 1994. *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl. Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest related Species within the Range of the Northern Spotted Owl.*

_____. 2001 (January). *"Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines.*

USDA Forest Service, US Department of Interior Bureau of Land Management, and US Department of Interior Fish and Wildlife Service (USDA and USDI). 1999. *Canada Lynx Conservation Assessment and Strategy.*

USDA Forest Service and USDI Bureau of Land Management. March 2004. *Record of Decision to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl.*

USDI Bureau of Land Management. 1999 and 2001. Northwest Forest Plan Survey and Manage protocols. Website: http://www.or.blm.gov/surveyandmanage/sp.htm.

USDI Fish and Wildlife Service (USFWS). 1986. *Recovery plan for the Pacific bald eagle.* U.S. Fish and Wildlife Service. Portland, Oregon.

Verts, B.J., and Carraway, L.N. 1998. *Land Mammals of Oregon.* University of California Press Berkeley and Los Angeles, California.

Whitmer, et al. 1998. *Forest carnivore conservation and management in the interior Columbia Basin: Issues and environmental correlates.* Gen. Tech. Rep. PNW-GTR-420. Portland, Oregon. U.S. Department of Agriculture, Pacific Northwest Research Station.

Personal Communications:

Isaacs, Frank (Senior Faculty Research Assistant), Oregon Cooperative Fish and Wildlife Research Unit, Oregon State University. Electronic mail. July 7, 2003.

Appendix D: Wildlife Biological Assessment and USFWS Concurrence Letter

Changes between Draft and Final EIS:

- USFWS concurrence letter added.

Biological Assessment for the Tamarack Quarry Expansion Project

Mt. Hood National Forest

Zigzag Ranger District

Clackamas County, Oregon

March 2004

Biological Assessment for the Tamarack Quarry Expansion Project

Mt. Hood National Forest

Zigzag Ranger District

Clackamas County

Prepared for and Reviewed by:

FS-Mt. Hood National Forest
Zigzag Ranger District
70220 E. Highway 26
Zigzag, Oregon 97049

Prepared by:

David Evans and Associates, Inc.
2100 SW River Parkway
Portland, Oregon 97201

March 2004

TABLE OF CONTENTS

INTRODUCTION

David Evans and Associates, Inc. (DEA) prepared this biological assessment (BA) for the Tamarack Quarry Expansion Project on the Mt. Hood National Forest, Zigzag Ranger District, Clackamas County, Oregon. This BA was prepared as a tool for coordination between those agencies responsible for the compliance of this project with the federal Endangered Species Act (ESA). These agencies are the U.S. Forest Service-Mt. Hood National Forest (FS), and the US Fish and Wildlife Service (USFWS). The applicant (FS) is seeking permission under the National Environmental Policy Act (NEPA) and related special uses permits to complete the project. This BA addresses potential effects to federally-listed northern spotted owl (*Strix occidentalis caurina*) that are likely to occur within the project area, as indicated by the FS.

This BA was presented to the Level 1 team for concurrence of the analysis on July, 24, 2003 and January 14, 2004. The comments and edits that were suggested at that meeting have been incorporated into this report for submittal to the USFWS.

PROJECT LOCATION

The project area is located approximately four miles south of Government Camp and US Highway 26, in Section 2, Township 4 South, Range 8 1/2 East, Willamette Meridian, Clackamas County, Oregon. The Tamarack Quarry, located approximately 3800 feet in elevation, is approximately one mile east of Trillium Lake. Figure 1 shows the project location and vicinity.

The project area encompasses approximately 48 acres adjacent to (generally north and east of) the existing 22 acre Tamarack Quarry. The project area also includes a corridor, approximately 3.1 miles long, along the existing haul route to the quarry from Highway 26. The haul route is along FS roads 2656 and 2656-955. The Northwest Forest plan land use allocation is matrix.

PROPOSED ACTION

The proposed action is to expand the existing Tamarack Quarry (Figure 2) (formerly known as the Mud Creek Quarry) to encompass a total area of approximately 50 to 70 acres of National Forest system land. There are three alternatives under consideration for this project. Under the no action alternative the quarry could expand within the existing permitted boundary by up to 7 acres. Alternatives 1 and 2 would expand the existing quarry beyond the permitted boundary by 48 and 28 acres, respectively. Rock would be excavated from the existing quarry and the expansion area. The excavated material would be used by ODOT and the FS for road maintenance and construction, including improvements to Highway 26 and Oregon Highway 35.

Through analysis, ODOT and the FS have determined that the site of the Tamarack Quarry is preferred over other quarry sites in the vicinity of Mt. Hood. Tamarack Quarry has the potential to be a relatively large quarry. It has been excavated and managed in a manner that facilitates continued excavation and appears to have reserves of quality source rock. The quarry has a relatively short haul route (approximately 3.1 miles) to Highway 26. However, the size of the existing quarry is inadequate to provide the amount of rock material needed over the next 20 years.

Activities would include blasting, rock crushing, screening, batching, loading and hauling, importing excess materials (e.g., from slides and ditch cleanings) for reprocessing or quarry reclamation, and stockpiling of excavated rock and soils. Materials would be stockpiled on-site either for reprocessing or for use in reclamation. Sanding rock would be hauled out of the quarry and stockpiled at various locations: junction of Highway 26 and Highway 35, Government Camp maintenance station, Bennett Pass, Parkdale, and junction of Highway 216 and Highway 26. Construction rock would be quarried as needed and used shortly after crushing.

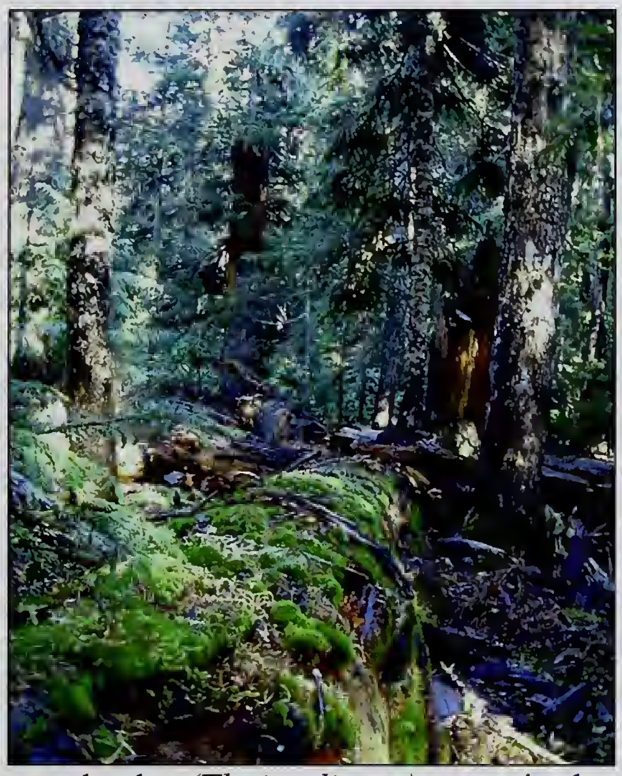
The haul route is approximately 3.1 miles long and includes FS roads 2656 and 2656-955. FS road 2656 is surfaced with asphalt. FS spur road 955 is gravel surfaced. No improvements would be made to the haul route except for routine maintenance, which may include resurfacing, striping, placement of safety reflectors, and placement of additional traffic signs. Traffic control, which may include flaggers and signs, would be implemented during hauling. Most trucks to haul the material would have a 20-yard capacity.

To date, a quarry excavation plan has not been developed. The amount of material to be removed each year could range from less than 40,000 cubic yards to more than 100,000 cubic yards.

Detailed reclamation plans would be developed and implemented as expansion occurs. Overburden soil has been and would continue to be saved for use during later reclamation of the quarry. The soil would be pushed back into the quarry benches and floors and planted with erosion-preventing, native grasses and other vegetation when the excavation is completed. Portions of the quarry could be reclaimed in stages, depending on the final quarry excavation plan.

EXISTING CONDITIONS

Vegetation within the project area is within the Pacific Silver Fir Zone (FS, 1982). Remnant old growth Douglas fir *(Pseudotsuga menziesii)* trees are scattered throughout the proposed expansion area and comprise what is remaining of the overstory canopy (see below). Pacific silver fir *(Abies amabilis),* western hemlock *(Tsuga heterophyla*), mountain hemlock (*Tsuga mertensiana*) and



western redcedar *(Thuja plicata)* occur in the midstory and understory within this area. Pacific rhododendron *(Rhododendron macrophyllum)* dominates most of the expansion area with scattered areas dominated by huckleberry *(Vaccinium* spp.). The herb layer is sparse with bear-grass (*Xerophyllum tenex*) as the dominant herb. There is a high density of down woody debris and snags within the proposed expansion area.

METHODS

A pre-field review of existing information and references for federally listed species was conducted for the project area. The Mt. Hood National Forest provided a list of the federally listed wildlife and fish species that could potentially occur in the project area. Habitat conditions for threatened and endangered species was evaluated on November 14, 2002. No surveys for threatened or endangered species were conducted for this project however several surveys have been conducted for species listed as "survey and manage" under the Northwest Forest Plan

ENVIRONMENTAL CONSEQUENCES

NORTHERN SPOTTED OWL

Status

The northern spotted owl is a federally listed threatened species in Oregon (January 15, 1992, CFR Vol. 57 No. 10), and is also a state listed threatened species under Oregon State Law (ORS 496-172).

Life History and Habitat Requirements

Throughout their range and during all seasons, spotted owls consistently concentrate their foraging and roosting in old-growth or mixed-age stands of mature and old-growth trees. Definitions of stands used by spotted owls have often varied among studies. Old-growth forests have usually been defined as having a dominant overstory of trees greater than 200 years old with a multi-layered, multiple tree species canopy, relatively high canopy closure, snags, and down logs. Mature stands used by spotted owls typically have included a mostly even-aged stand with a minimum age of dominant trees ranging from 70 to 100+ years old, and a minimum diameter at breast height (dbh) ranging from 16 to 21 in (40.6 to 53.3 cm) (Thomas et al., 1990).

Most spotted owl nests have been found in old-growth stands. A variety of nest structures have been used, including tree cavities, trees with broken tops, and platforms. Platform nests have included natural accumulation of debris in tree limbs and the abandoned nests of hawks, squirrels, or woodrats. Platform nests are frequently located in deformed clumps of limbs resulting from dwarf mistletoe infestation.

Although spotted owls consistently selected mature and old-growth forests in the studies reviewed, considerable use of mid-age and young stands also occurred. This use suggests that as forests develop along the continuum from young to old, they gradually become more suitable for spotted owls. At the same time, structural components typical of old-growth forests are sometimes found in young forests, especially those that have regenerated after fire or other disturbances, which have left behind large trees, snags, and logs from previous stands (Thomas et al., 1990).

Distribution and Occurrence at Project Area

The present range of the spotted owl approximates the limits of the historic range, which encompasses an area from southwestern British Columbia south through the coastal mountains and Cascade Range (both east and west sides) of Washington and Oregon, south into southwestern Oregon and northwestern California (Thomas et al., 1990).

There is a known spotted owl nest site near the project area located over 0.5 miles (mi) (0.8 kilometers [km]) but within 1.0 mi (1.6 km) of the project area. This location is to the west of the project area in the Mud Creek drainage. Spotted owl surveys were not conducted for this project.

The project area is not in a Critical Habitat Unit (CHU). The closest CHU (OR-1) is location over 2.0 mi (3.2 km) to the north.

Existing Habitat Conditions

The FS has mapped suitable spotted owl nesting, roosting, and foraging (NRF) habitat across the forest based on aerial photograph interpretation. DEA has analyzed this map for the project area and determined the area is dispersal habitat. A field reconnaissance of the proposed expansion area determined that this area does not provide suitable NRF habitat for spotted owls. The majority of the expansion area has an open canopy (less than 50% total canopy closure) with remnant Douglas fir trees that are 20-60 feet above the canopy layer. The height of the overstory canopy layer is approximately 50-80 feet with numerous snags and large woody debris that are the remnants of the prior stand. Based on the FS habitat map and field reconnaissance the project area, at best, serves as dispersal habitat.

Analysis of Project Impacts

No northern spotted owl NRF habitat will be removed in conjunction with this project. However, there is field verified suitable NRF habitat within one mile of the quarry and 0.25 mile of the haul route. These distances were used to evaluate potential disturbance to nesting spotted owls and is based on the Programmatic Biological Assessment for Activities with the Potential to Disturb Northern Spotted Owls and /or Bald Eagles in the Willamette Province for FY 2002-2003 (BLM/USFS 2002) and the Estimates of Distances at which Incidental Take of Murrelets and Spotted Owls Due to Harassment are Anticipated from Sound-Generating, Forest-Management Activities in Olympic National Forest Appendix F. (USFWS 2003).

Since surveys were not conducted for this project, the adjacent NRF habitat is assumed to be occupied for the purposes of determining impacts. Depending on the selected alternative, up to 48 acres of dispersal habitat may be removed to expand the quarry.

The proposed project will generate noise above local ambient levels when the quarry is in operation. The sources of the noise will include blasting (of over 2 pounds of expolsives), rock crushing, bulldozers or similar type equipment to move rock within the quarry and load trucks. The trees would in the expansion area would be most likely removed over a several year period as expansion is expected to occur slowly over the 20 year period. The duration of these activities will depend on the need for rock over the next 20 years. There are two known ODOT road construction projects on Hwy. 35 scheduled to begin in summer 2005 that would require rock from the quarry. Sanding rock will be needed for the winter of 2004. Noise-generating quarry operations, including hauling, would occur on weekdays (Monday at 7:00 a.m. through Friday at noon) during the summer and fall when the haul road is clear of snow. Snow in this area typically persists until the end of May making for a limited work window.

Determination of Effect

There will be no modification to NRF habitat for northern spotted owl in conjunction with this project however up to 48 acres of dispersal habitat may be removed to expand the quarry. Blasting at the quarry would not begin until after July 15 of each year to minimize disturbance to adjacent nesting owls during the critical breeding period of March 1 to July 15. Quarry operations such as crushing, stockpiling, hauling and road maintenance may occur in the breeding season as access to the quarry allows. Access to the quarry is difficult in the spring due to typically large snowpacks. It is assumed that ODOT will plow to quarry no earlier than April of each year. These activities would occur within 0.25 miles of what is considered occupied habitat. Although no NRF habitat will be

removed, dispersal habitat will be removed and the quarry operations in particular blasting could disturb nesting spotted owls after the critical nesting period. It is therefore determined that this project would **may affect, not likely to adversely affect** the northern spotted owl.

In the event that the no action alternative is selected, the FS would still continue to operate the quarry under the existing permits. However, prior consultation for these activities has not occurred and informal consultation will need to be initiated. Quarry expansion and associated operations would be limited to the existing permitted boundary, which includes removal of vegetation up to 7 acres. There would be no modification of NRF habitat but dispersal habitat will be removed. Quarry operations, rock haul, and road maintenance would be the same as the action alternatives stated above. Blasting would only take place after July 15. Therefore the no action alternative would **may affect, not likely to adversely affect** the northern spotted owl.

CONSERVATION MEASURES FOR LISTED SPECIES

- Blasting will only take place after July 15.
- Blasting and quarry operations (including hauling) will be limited to daylight hours.
- Mufflers will be placed on equipment during operation to minimize noise.
- A blasting plan and quarry operation plan will be developed that outlines the hours of operations, blasting times.
- A reclamation plan will be developed and native vegetation will be used.

INTERRELATED, INTERDEPENDENT, AND CUMULATIVE IMPACTS

Secondary impacts include interrelated projects that have no independent utility apart from the proposed action, and interdependent projects that are a part of a larger action and depend on the larger action for justification. Cumulative impacts are defined as those impacts that "result from the incremental consequences of an action when added to other past and reasonably foreseeable future actions" (40 CFR 1508.7). The cumulative effects of an action may be undetectable when viewed in the individual context of direct and even secondary impacts, but can nonetheless add to other disturbances and eventually lead to a measurable environmental change.

Future Federal actions are subject to the consultation requirements established in section 7 of the ESA, and therefore are not considered cumulative in the proposed action. There were no known significant non-Federal projects occurring near the project area, or within the watershed, that were available for the analysis of secondary or cumulative impacts. It is anticipated that this project, even in combination with Federal projects, will not have a significant impact on listed, proposed, or candidate species.

CONCLUSION

Based on field investigations, review of literature and data, and conversations with FS staff, and the Level 1 team, the proposed project ***may affect not likely to adversely affect*** the northern spotted owl.

PREPARERS AND CONTRIBUTORS

This report was written by Kristine Marshall, DEA Wildlife Biologist.

Preparer ______________________________

Kristine Marshall, DEA Wildlife Biologist

DEA Reviewer ______________________________

Dave Kennedy, DEA Wildlife Biologist

FS Reviewer ______________________________

Alan Dyck, Forest Wildlife Biologist

BIBLIOGRAPHY

Franklin, J.T. and Dyrness, C.T. 1973. *Natural Vegetation of Oregon and Washington.* USDA Forest Service General Technical Report PNW-8.

Oregon Natural Heritage Program (ONHP). 2001. *Rare, Threatened and Endangered Species of Oregon.* Oregon Natural Heritage Program, Portland, Oregon.

Thomas, J.W., et al. 1990. *A Conservation Strategy for the Northern Spotted Owl.* Interagency Scientific Committee to address the Conservation of the Northern Spotted Owl.

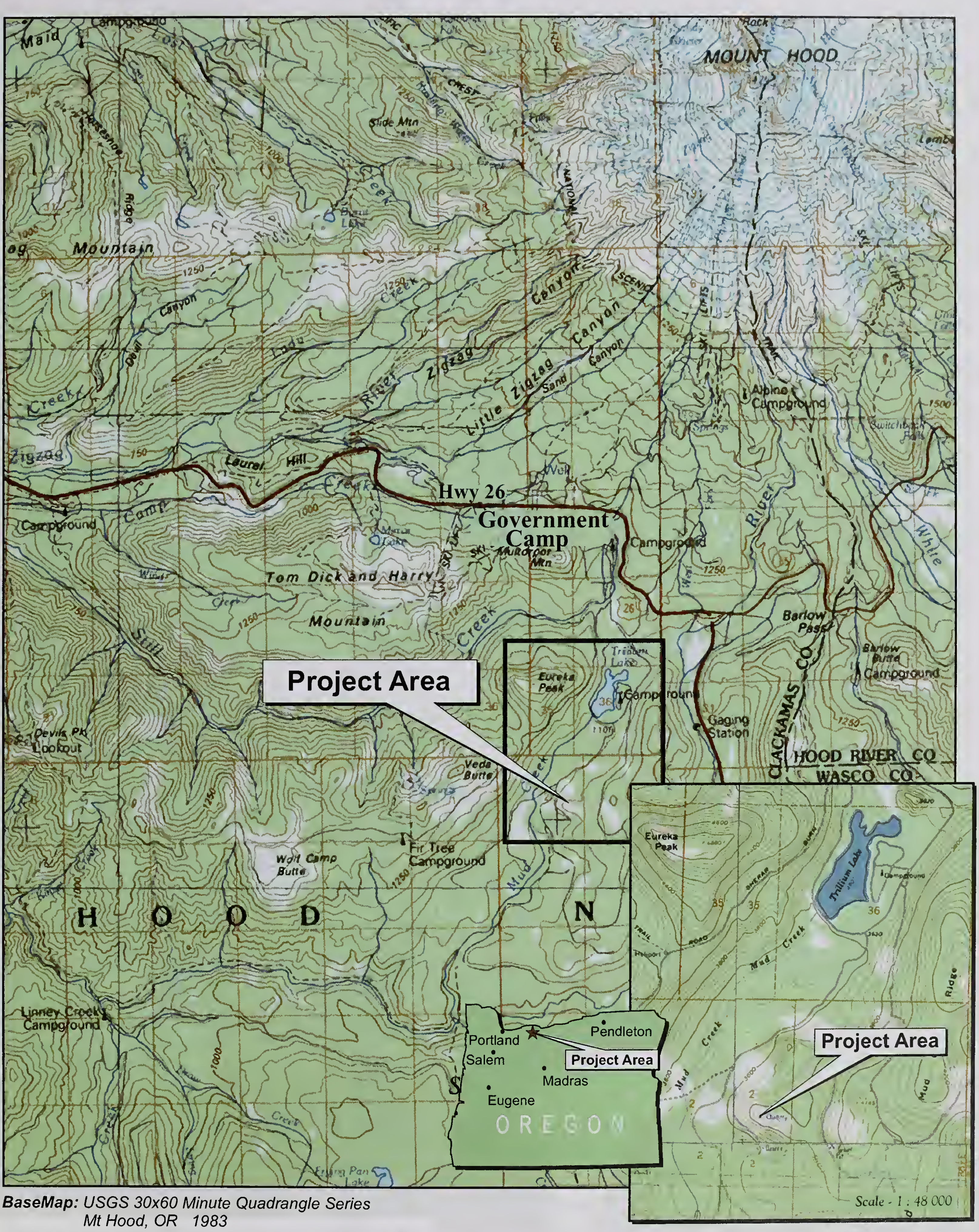
USDA Forest Service 1995. *Salmon River Watershed Analysis. First Iteration.* Mt Hood National Forest.

USDA Forest Service and USDI Bureau of Land Management. April, 1994. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl. Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest related Species within the Range of the Northern Spotted Owl.

USDA Forest Service and USDI Bureau of Land Management. January, 2001. Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, protection Buffer, and other Mitigation Measures Standards and Guidelines for Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl.

USDA Forest Service and USDI Bureau of Land Management. September, 2001. Programmatic Biological Assessment for Activities with the Potential to Remove Habitat of Northern Spotted Owls and /or Bald Eagles in the Willamette Province for FY 2002.

USDA Forest Service and USDI Bureau of Land Management. March, 2002. Programmatic Biological Assessment for Activities with the Potential to Disturb Northern Spotted Owls and/or Bald Eagles in the Willamette Province for FY 2002-2003.

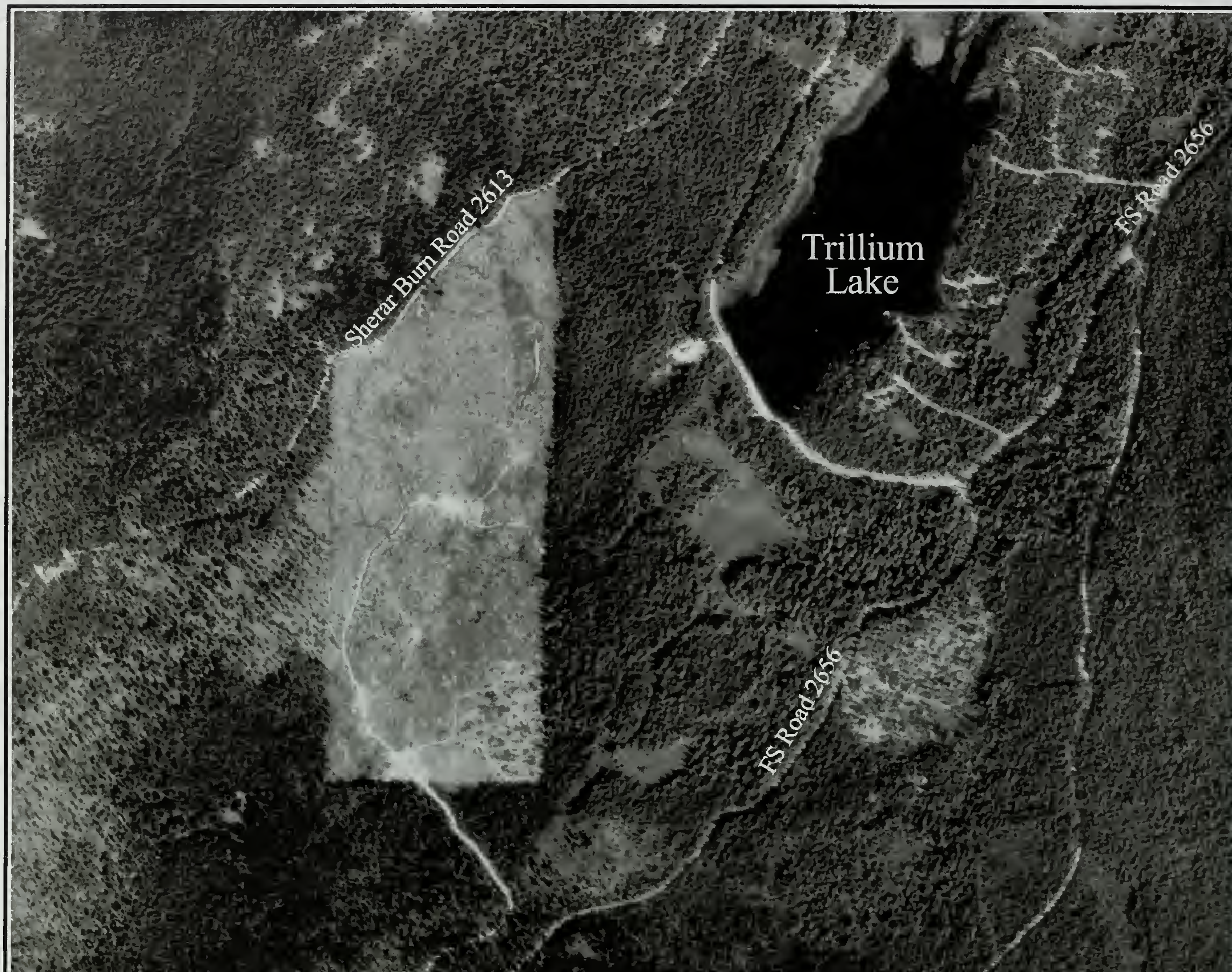


BaseMap: *USGS 30x60 Minute Quadrangle Series*
Mt Hood, OR 1983

Inset Map: *USGS 7.5 Minute Quadrangle Series*
Mt Hood South, OR 1980; Government Camp, OR 1980;
Wolf Peak, OR 1985; Wapinitia Pass, OR 1985

Figure 1
Vicinity

Scale - 1 : 100 000



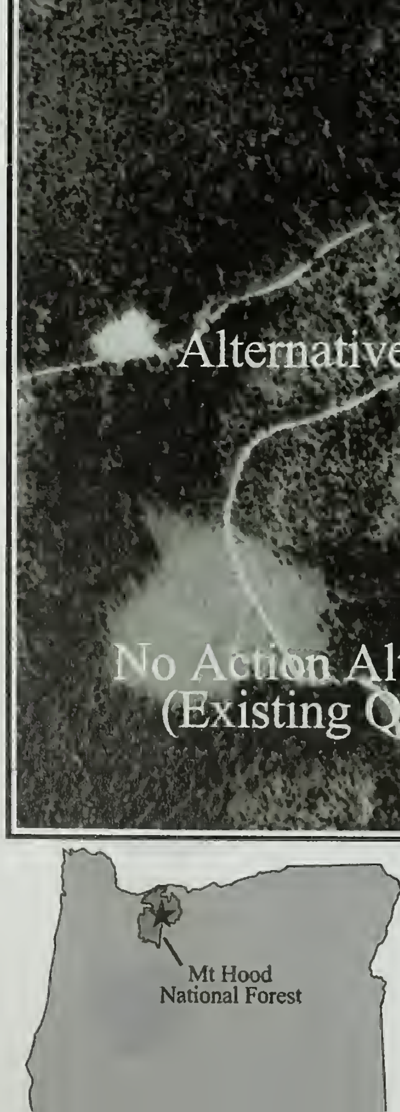


Figure 2
Alternatives Under Consideration

DAVID EVANS

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Oregon Fish and Wildlife Office
2600 SE 98th Avenue, Suite 100
Portland, Oregon 97266
Phone: (503)231-6179 FAX: (503)231-6195

Reply To: 8330.04274(04)
File Name: Tamarack Quarry Expansion Concurrence letter.doc
TS Number: 04-2589

June 23, 2004

Gary Larsen
Mt. Hood National Forest
16400 Champion Way
Sandy, OR 97055-7248

RE: Request for concurrence on Tamarack Quarry Expansion Biological Assessment. (Log # 1-7-04-I-0427)

Dear Mr. Larsen:

This letter is in response to your April 29, 2004 request for concurrence with your determination of effects for the proposed action, Tamarack Quarry Expansion Project. On May 3, 2004, the U.S. Fish and Wildlife Service (Service) received your biological assessment (BA) evaluating the impacts of the proposed project on the federally threatened northern spotted owl (*Strix occidentalis caurina*) listed under the Endangered Species Act (Act) of 1973, as amended, (16 U.S.C. 1531 et seq.). On May 25, 2004, the Service, along with Mt. Hood National Forest and David Evans and Associates (DEA) representatives visited the project location. DEA prepared the Tamarack Quarry Expansion Project BA. From this visit, the Service determined that additional information was needed in support of the BA. On June 3, the Service received the requested information (Log # 04-2998) from DEA.

Your BA correspondence provides the conclusion that the proposed project may affect, but is not likely to adversely affect the northern spotted owl. The following discussion provides the Service's concurrence on your effects determination in accordance with Section 7 of the Act.

Description of Project Location and Proposed Action

The proposed project is located approximately 6 km (4 miles) south of Government Camp and US Highway 26, in Section 2, Township 4 South, Range 8.5 East, Willamette Meridian, Clackamas County, Oregon (Figure 1). The proposed project encompasses approximately 19 ha (48 acres) adjacent to (generally north and east of) the existing 9 ha (22 acre) Tamarack Quarry. The project area also includes a corridor, approximately 5 km (3.1 mile) long, along the existing haul route to the quarry from Highway 26. The haul route is on Forest Service (FS) roads 2656 and 2656-955. The Northwest Forest Plan land use allocation is Matrix.

motor-homes, as well as aircraft occasionally landing at a nearby airstrip (personal communication with D. Kennedy, DEA). Hauling associated with the quarry operations is not likely to exceed existing ambient noise levels for the area (personal communication with D. Kennedy, DEA). The Service concurs with this assessment and is of the opinion that the hauling traffic will not likely disrupt the breeding behavior of owls that may occupy NRF habitat along FS road 2656.

Conservation Measures proposed by the Forest Service

- Blasting will only take place after July 15.
- Blasting and quarry operations (including hauling) will be limited to daylight hours.
- Mufflers will be placed on equipment during operation to minimize noise.
- A blasting and quarry operation plan will be developed that outlines the hours of operation and blasting times.
- A reclamation plan will be developed and native vegetation will be used.

Concurrence

In consideration of the current status of the northern spotted owl in the proposed project vicinity and an analysis of the project effects and proposed conservation measures, the Service concurs that the Tamarack Quarry Extension Project and related activities, as currently planned, **may affect, but are not likely to adversely affect** the northern spotted owl. We have no additional information at this time to provide which would alter your determination of effects to the northern spotted owl. The requirements established under section (7)(a) and 7(c) of the Act have been met, thereby concluding the informal consultation process. If new information reveals the proposed project may affect species in a manner or to an extent not considered in your correspondence, or new species or critical habitat is designated that may be affected by the proposed activity, work on the project should be halted and consultation should be reinitiated within one business day.

If you have any question or need more information, please contact Jim Thrailkill or Bob Progulske at (503) 231-6179.

Sincerely,

Kemper M. McMaster
State Supervisor

cc: Mt. Hood National Forest *Attn*: Alan Dyck
FWS-RO; *Attn*: L. Salata
FWS-OSO; *Attn:* B. White

Appendix E: Botanical Biological Evaluation and Noxious Weed Report

Changes between Draft and Final EIS:

- Updated discussions on survey and manage species
- Updated management direction for controlling invasive species

Appendix E: Botanical Biological Evaluation and Noxious Weed Report

Changes between Draft and Final EIS:

- Updated discussions on survey and manage species
- Updated management direction for controlling invasive species

Botany Biological Evaluation, NWFP Report, and Noxious Weed Risk Analysis for Tamarack Quarry Expansion Project

---

THREATENED, ENDANGERED & SENSITIVE PLANT BIOLOGICAL EVALUATION

PROJECT LOCATION AND DESCRIPTION

The project is located approximately four miles south of Government Camp and US Highway 26, in Section 2, Township 4 South, Range 8 1/2 East, Willamette Meridian, Clackamas County, Oregon (see Figure 1). The Tamarack Quarry is approximately one mile south of Trillium Lake. The haul route for the quarry is along Forest Service (FS) roads 2656 and 2656-955. The project area encompasses approximately 52 acres adjacent to (generally north and east of) the existing Tamarack Quarry. The existing quarry occupies approximately 22 acres, although it is currently permitted to expand to 29 acres.

The proposed action is to expand the existing Tamarack Quarry (formerly known as the Mud Creek Quarry) to encompass approximately 50 to 70 acres of National Forest system land. Rock would be excavated from the existing quarry and the expansion area. The excavated material would be used by Oregon Department of Transportation (ODOT) and the FS for road maintenance and construction, including improvements to Highway 26 and Oregon Highway 35. Activities would include clearing vegetation, blasting, rock crushing, screening, batching, loading and hauling, importing excess materials (e.g., from slides and ditch cleanings) for reprocessing or quarry reclamation, and short-term stockpiling of excavated rock and soils. Materials would be stockpiled on-site either for reprocessing or for use in reclamation. Sanding rock would be hauled out of the quarry and stockpiled at various locations: junction of Highway 26 and Highway 35, Government Camp maintenance station, Bennett Pass, Parkdale, and junction of Highway 216 and Highway 26. Construction rock would be quarried as needed and used shortly after crushing.

The haul route is approximately 3.1 miles long and includes FS roads 2656 and 2656-955. FS road 2656 is surfaced with asphalt. FS spur road 955 is gravel surfaced. No improvements would be made to the haul route except for routine maintenance, which may include resurfacing, striping, placement of safety reflectors, and placement of additional traffic signs.

Detailed reclamation plans would be developed and implemented as expansion occurs. Overburden soil has been and would continue to be saved for use during later reclamation of the quarry. The soil would be pushed back into the quarry benches and floors and planted with erosion-preventing, native grasses and other vegetation when the excavation is completed. Portions of the quarry could be reclaimed in stages, depending on the final quarry excavation plan.

INTRODUCTION

All Forest Service projects, programs, and activities are to be reviewed for possible effects on Proposed Endangered, Threatened, and Forest Service Sensitive Species and the findings documented in the Decision Notice (FSM 2672.4). There is no potential habitat for any USFWS Threatened or Endangered Plants on the Mount Hood National Forest. However, twenty-seven plants on the Regional Forester's List of Sensitive Plants and Their Habitats may be found on the Clackamas River and Zigzag Ranger Districts of the Mt. Hood National Forest. These species are listed on the following pages.

There are three steps in a plant biological evaluation that fulfill the requirements dictated by the USFS Manual (2672.42, 2672.43). Step 4 may also be required in certain circumstances. The steps are as follows:

Step 1. Pre-field Review: Each area to be affected by management actions is investigated for Sensitive Plant habitat in the pre-field review. The following sources are consulted to determine whether potential habitat exists: R-6 Regional Forester's and Mt. Hood National Forest Potential Endangered, Threatened, and Sensitive Plant Handbook, Oregon Natural Heritage Database and the Mt. Hood NF Database records, previous botanical surveys, aerial photos, USGS topographic maps, and knowledge provided by individuals familiar with the area. Each plant on the Mt. Hood NF Sensitive Plant List is considered. Most Sensitive Plants tend to be found in riparian zones, meadows, bogs, scree slopes, rocky outcrops, and high volcanic areas. These are considered high priority habitat.

Step 2. Field Reconnaissance: Field reconnaissance is conducted on a priority basis. The first priority is those units or project areas which have been identified as having high probability habitats in or surrounding the unit/project area. The next priority is all other units/project areas. Surveys for the first priority units include, at a minimum, an intense search of all high probability habitat during the season when plant identification is possible. Surveys for second priority habitat are composed of a field check of the unit to search for habitat that may not have been found in the pre-field review. If a sensitive plant is found, R-6 Site forms are completed and sent to the Mt. Hood NF Headquarters Office and the Oregon Natural Heritage Database.

Step 3. Risk Assessment: If a Sensitive Plant is found on or adjoining a site where action is proposed, a risk assessment (analysis of the effects of a proposed action on species and their habitats) must be performed. A risk assessment considers (a) the likelihood of beneficial/adverse effects, and (b) the consequences of these effects on a Sensitive Plant population to determine what the cumulative effects would be to the overall population. Management recommendations are given to mitigate for adverse effects.

Step 4. Botanical Investigation: When initial risk assessment reaches the conclusion "Unknown Impact (UI)" a Botanical Investigation is required. This procedure involves additional investigation that essentially becomes background information for a conservation strategy. The result is a determination of significance of effects on species conservation and population objectives.

STEP 1. PRE-FIELD REVIEW OF EXISTING INFORMATION

The following sources were consulted: R-6 Regional Forester's and Mt. Hood National Forest Potential Endangered, Threatened, and Sensitive Plant Handbook, Oregon Natural Heritage Database and the Mt. Hood NF Database records, previous botanical surveys, aerial photos, and USGS topographic maps.

Region 6 Threatened, Endangered, or Sensitive Plants documented or suspected on the Clackamas River and Zigzag Ranger Districts of the Mt. Hood National Forest are contained in the following two tables. The tables were updated in May 1999.

Documented

Plant Name	Habitat	TNC	USFWS	ODA	ONHP
Aster gormanii Gorman's aster	Dry cliffs, talus, rock slopes	G3S3	____	____	1
Botrychium montanum mountain grape-fern	Forested wet	G3S2	____	____	2
Calamagrostis breweri Brewer's reedgrass	Subalpine moist, grassy	G3S2	____	____	2
Carex livida pale sedge	Wet-dry meadow, bog	G5S2	____	____	2
Cimicifuga elata tall bugbane	Forested mesic	G3S3	____	C	1
Coptis trifolia 3-leaflet goldthread	Forested wet & mesic	G5S1	____	____	2
Corydalis aquae-gelidae cold water corydalis	Forested wet	G3S3	____	C	1
Diphasiastrum complanatum ground cedar	Forested mesic	G5S2	____	____	2
Erigeron howellii Howell's daisy	Moist-dry cliffs, talus, rocky slopes	G2S2	____	C	1
Fritillaria camschatcensis Indian rice	Moist-dry meadow	G5S1	____	____	2
Lewisia columbiana v. columbiana Columbia lewisia	Dry cliffs, talus, rocky slopes	G4T4S2	____	____	2
Lycopodiella inundata bog club moss	Meadow – wet, bog	G5S2	____	____	2
Ophioglossum pusillum adder's tongue	Wet-dry meadow, bog	G5S1	____	____	2
Scheuchzeria palustris v.americana scheuchzeria	Wet meadow, bog	G5T5S2	____	____	2
Sisyrinchium sarmentosum pale blue-eyed grass	Moist-dry meadow	G2S1	SoC	C	1
Suksdorfia violacea violet suksdorfia	Cliffs, talus, rocky slopes	G4S1	____	____	2

Plant Name	Habitat	TNC	USFWS	ODA	ONHP
Taushia stricklandii Strickland's taushia	Moist-dry meadow	G4S1	____	____	2
Wolffia columbiana water-meal	Pond, lake, gently flowing water	G5S1	____	____	2

Suspected

Plant Name	Habitat	TNC	USFWS	ODA	ONHP
Agoseris elata tall agoseris	Moist-dry meadow	G4S1	____	____	2
Botrychium lanceolatum lance-leaved grape fern	Forested wet	G5S3	____	____	2
Botrychium minganense moonwort	Forested wet	G4S2	____	____	2
Botrychium pinnatum pinnate grape fern	Forested wet	G5S2S3	____	____	2
Montia howellii Howell's montia	Moist-dry lowlands	G3S2	____	C	4
Phlox hendersonii Henderson's phlox	Subalpine, dry, rocky, scree	G4S1	____	____	2
Potentilla villosa villous cinquefoil	Subalpine, dry, rocky, scree	G4S1	____	____	2
Romanzoffia thompsonii mistmaiden	Wet, rocky, sunny	G3S3	____	____	1
Wolffia borealis dotted water-meal	Pond, lake, gently flowing water	G5S1	____	____	2

TNC (Natural Heritage)

G Global rank
G1 Critically imperiled throughout range
G2 Imperiled throughout its range
G3 Rare, threatened, uncommon in range
G4 Not rare, apparently secure in range
G5 Widespread, abundant & secure in range
S State rank
S1 Critically imperiled in Oregon
S2 Imperiled in Oregon
S3 Rare, threatened or uncommon in Oregon

ODA (Oregon State Status)

LE Listed Endangered Species
LT Listed Threatened Species
PE Proposed Endangered Species
PT Proposed Threatened Species
C Candidate for Listing as T or E

ONHP (Oregon Natural Heritage Program)

1. Contains taxa threatened with extinction or presumed to be extinct throughout their entire range
2. Contains taxa that are threatened with extirpation or presumed to be extirpated from the state of Oregon
3. Contains species for which more information is needed before status can be determined
4. Contains taxa of concern which are not currently threatened or endangered

USFWS (US Fish and Wildlife Service)

LT Listed Threatened
LE Endangered
PT Proposed Threatened
PE Proposed Endangered
C Candidate taxa for which the USFWS has sufficient information to support a proposal to list under the ESA
SoC Species of Concern. Former C2 candidates which need additional information in order to propose as T or E under the Endangered Species Act. USFWS is reviewing for consideration as Candidates for listing under the ESA.

Survey Level A: Aerial photo interpretation and review of existing records. This is a determination of the potential for a listed species to occur within the proposed project area. No field surveys are done at this point.

Discussion/Results of Pre-field Review

Records and maps cited in Step 1, page 2 were consulted. The following results were obtained:

A. Sensitive Plant sites previously documented within the proposed project areas:
No sensitive plant sites are known to occur within the project area.

B. Sensitive Plant sites previously documented adjacent to the proposed project area(s) that are potentially impacted by the project: N/A

C. _XX__ Refer to the following table for any Sensitive Plant sites and their habitat that are likely to occur within the proposed project area or are likely to occur in areas outside the proposed project area that may be impacted by project activities. See Figure 2. A Biological Evaluation is not complete without the completion of Step 2, Field Reconnaissance, if habitat is likely to occur within the proposed project area.

Species	Potential Habitat Present?	Species	Potential Habitat Present?
Agoseris elata	No	*Lewisia columbiana v.columbiana*	No
Aster gormanii	Yes	*Lycopodiella inundata*	No
Botrychium lanceolatum	Yes	*Montia howellii*	No
Botrychium minganense	Yes	*Ophioglossum pusillum*	No
Botrychium montanum	Yes	*Phlox hendersonii*	No
Botrychium pinnatum	Yes	*Potentilla villosa*	No
Calamagrostis breweri	No	*Romanzoffia thompsonii*	No
Carex livida	No	*Scheucherzia palustris v.americana*	No
Cimicifuga elata	No	*Sisrynchium sarmentosum*	No

Species	Potential Habitat Present?	Species	Potential Habitat Present?
Corydalis aquae-gelidae	No	*Suksdorfia violacea*	No
Coptis trifolia	No	*Taushia stricklandii*	No
Diphasiastrum complanatum	No	*Wolffia borealis*	No
Erigeron howellii	No	*Wolffia columbiana*	No
Fritillaria camschatensis	No		

D. ________ No Sensitive Plant species or their habitats are likely to occur within the proposed project area or in areas adjacent to the project that may be affected by project activities. If no Sensitive species or their habitats are present, then Biological Evaluation is complete at this stage.

STEP 2. FIELD RECONNAISSANCE

A field reconnaissance was conducted for all Sensitive Plant species and their habitats known to occur or suspected to occur within all areas affected by project activities.

Survey Level

Level B – Level A plus single-entry survey of probable habitats. Areas are identified by photos and existing field knowledge. Field surveys are conducted during the season most favorable for species identification. Salix Associates completed a field review of the site on July 24, 2003.

Level C – Level A plus multiple-entry survey for listed species likely to inhabit the project area. Conducted at different dates when species identifiable at different times of the season are suspected to occur within areas affected by the project.

Survey Design

Design 1/Field Check
The surveyor gives the area a quick "once over" but does not walk completely through the project area. The entire project area has not been examined.

Design 2/Cursory
The surveyor gives the area a "once over" by walking through the project area. The entire project area has not been examined.

Design 3/Limited Focus
The surveyor closely examines one or more habitat specific locations within the project area but does not look at the rest of the area.

Design 4/General
The surveyor gives the area a closer look by walking through the project area and walking around the perimeter of the area or by walking more than once through the area. Most of the project area is examined.

Design 5/Intuitive Controlled

The surveyor has a closer look by conducting a complete examination of specific areas of the project after walking through the project area and perimeter or by walking more than once through the area.

Design 6/Complete

The surveyor has walked throughout the area being examined until nearly all of the area has been examined.

Results and Discussion of Survey:

Species	Species Present?	Species	Species Present?
Agoseris elata	No	*Lewissia columbiana v.columbiana*	No
Aster gormanii	No	*Lycopodiella inundata*	No
Botrychium lanceolatum	No	*Montia howellii*	No
Botrychium minganense	No	*Ophioglossum pusillum*	No
Botrychium montanum	No	*Phlox hendersonii*	No
Botrychium pinnatum	No	*Potentilla villosa*	No
Calamagrostis breweri	No	*Romanzoffia thompsonii*	No
Carex livida	No	*Scheucherzia palustris v.americana*	No
Cimicifuga elata	No	*Sisrynchium sarmentosum*	No
Corydalis aquae-gelidae	No	*Suksdorfia violacea*	No
Coptis trifolia	No	*Taushia stricklandii*	No
Diphasiastrum complanatum	No	*Wolffia borealis*	No
Erigeron howellii	No	*Wolffia columbiana*	No
Fritillaria camschatensis	No		

______The above-listed Sensitive Plant species were located either within the project area or in an area outside the project boundary that may potentially be impacted by the proposed project. Proceed to Step 3. Risk Assessment. Biological Evaluation is not yet complete.

OR

_XX__No Sensitive Plant species were located within the proposed project area or in an area outside the project boundary that may potentially be impacted by the proposed project. It is unlikely that surveys at other times of year would locate any Sensitive Plants. Biological Evaluation is complete. This conclusion is equivalent to "No impact" risk assessment for Sensitive Plants.

Surveyed by_Salix Associates_______________ Survey Dates__July 24, 2003_
Survey Level_B________________ Survey Design_5 and 6______

STEP 3. RISK ASSESSMENT

The determination of risks to populations of Sensitive Plants takes into consideration the size, density, vigor, habitat requirements, location of the population, and the consequence of an adverse effect on the species as a whole within its range and within the Mt. Hood National Forest. Determine the risk assessment for each sighting of Sensitive Plant species located within or outside the project area that may be impacted by project activities.

Risk Assessment Levels for Sensitive Species:

No Impact (NI)

A determination of "No Impact" for Sensitive Species occurs when a project or activity will have no environmental effects on habitat, individuals, a population, or a species.

May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species (MIIH)

Activities or actions, which have effects that are immeasurable, minor or are consistent with Conservation Strategies, would receive this conclusion. For populations that are small or vulnerable each individual may be important for short and long term viability.

If risk assessment is MIIH, identify the cause(s) and effect(s) and describe mitigation measures necessary to reduce risks.

Will Impact Individuals or habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of Viability to the population or species (WIFV)

Loss of individuals or habitat can be considered significant when the potential effect may be:

1. Contributing to a trend toward Federal listing (C-1 or C-2 species),
2. Results in a significantly increased risk of loss of viability to a species, or
3. Results in a significantly increased risk of loss of viability to a significant population (stock).

If risk assessment is WIFV, identify the cause(s) and effect(s) and describe mitigation measures that, if adopted, would reduce the effects to a level so that the project would not cause a trend toward federal listing or a loss of viability.

Beneficial Impact (BI)

Projects or activities that are designed to benefit or that measurably benefit a Sensitive Species should receive this conclusion.

Unknown Impact (UI)

The risk to Sensitive Species is unknown proceed to Step 4. Botanical Investigation.
Species: Site: Risk Assessment:

STEP 4. BOTANICAL INVESTIGATION

Additional information is required to determine the significance of the proposed project's effects on a Sensitive Plant species over its entire range. The investigation may require additional inventory information and an assessment of cumulative effects on the species over its entire range. Address the estimated impact on project area populations, regional species viability, statewide species viability, and total (entire range) species viability. Consider cumulative effects, gene pool diversity, and both long-and short-term changes in habitat. Include references and any documentation from consultation with USFWS. Note: Consultation is required for listed or proposed species and recommended for category 1 or 2 candidate species.)

For each species determine:

1. habitat requirements
2. effects of proposed management activities on required habitats of the species
3. cumulative effects of current and planned activities on the species as a whole

Results of Botanical Investigation:

Species: Site: Risk Assessment:

Biological Evaluation Summary of Effects

Species	Alternative 1 Proposed Action	Alternative 2 No Action
Agoseris elata	NI	NI
Aster gormanii	NI	NI
Botrychium lanceolatum	NI	NI
Botrychium minganense	NI	NI
Botrychium montanum	NI	NI
Botrychium pinnatum	NI	NI
Calamagrostis breweri	NI	NI
Carex livida	NI	NI
Cimicifuga elata	NI	NI
Corydalis aquae-gelidae	NI	NI
Coptis trifolia	NI	NI
Diphasiastrum complanatum	NI	NI
Erigeron howellii	NI	NI
Fritillaria camschatensis	NI	NI
Lewisia columbiana v. columbiana	NI	NI
Lycopodiella inundata	NI	NI
Montia howellii	NI	NI
Ophioglossum pusillum	NI	NI
Phlox hendersonii	NI	NI
Potentilla villosa	NI	NI
Romanzoffia thompsonii	NI	NI
Scheucherzia palustris v. americana	NI	NI
Sisyrinchium sarmentosum	NI	NI
Suksdorfia violacea	NI	NI
Taushia stricklandii	NI	NI
Wolffia borealis	NI	NI
Wolffia columbiana	NI	NI

NI	No Impact
MIIH	May impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species.
WIFV	Will impact individuals or habitat with a consequence that the action may contribute to a trend towards federal listing or cause a loss of viability to the population or species. (Trigger for a Significant Action per NEPA)
BI	Beneficial Impact
UI	Unknown Impact

NORTHWEST FOREST PLAN SURVEY AND MANAGE FUNGI, LICHEN, BRYOPHYTE AND VASCULAR PLANT REPORT

Pre-disturbance Surveys

The Record of Decision and Standards and Guidelines for Amendments to Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines, January 2001 amended the Northwest Forest Plan. They set forth both a revised list of species requiring surveys prior to habitat-disturbing activities and species requiring management of known sites.

This portion of the Northwest Forest Plan was again modified by the Record of Decision to Remove or Modify the Survey and Manage Mitigation Standards and Guidelines (2004 Survey and Manage ROD). The 2004 Survey and Manage ROD removed the Survey and Manage Mitigation Standards and Guidelines, replacing them with Special Status Species Policies. Under those policies, pre-project clearances are completed prior to habitat-disturbing activities to determine the presence of special status (i.e., FS sensitive) species or their habitat. This ROD has been set aside as a result of a court action in January of 2006 and the January 2001 ROD has been reinstated.

The surveys were conducted prior to the 2004 modification of the survey and manage direction and in accordance with the 2001 Survey and Manage ROD.

The following is a list of botanical Survey and Manage species for which there may be habitat on the Zigzag and Clackamas River Ranger Districts. This list includes species for which there are no formal protocols (in bold); these species were considered equivalent to those with protocols for the purpose of this report. The vascular plant and fungus (noble polypore, *Bridgeoporus nobilissimus*) survey was conducted by Salix Associates on 24 July 2003, and the bryophyte and lichen survey was conducted by Ron Hamill of Cryptogam Research Associates on 5 August 2003. USFS search protocols were followed for all species and species groups.

Botrychium minganense (vascular plant)
Botrychium montanum (vascular plant
Bridgeoporus nobilissimus (fungi)
Coptis trifolia (vascular plant)
Corydalis aquae-gelidae (vascular plant)
Cypripedium fasciculatum (vascular plant)
Cypripedium montanum (vascular plant)
Galium kamtschaticum (vascular plant)
Hypogymnia duplicata (lichen)
***Leptogium burnetiae* var. *hirsutum* (lichen)**
***Leptogium cyanescens* (lichen)**
Lobaria linita (lichen)
***Platismatia lacunosa* (lichen)**
Pseudocypellaria rainierensis (lichen)
***Ramalina thrausta* (lichen)**
Schistostega pennata (moss)

Tetraphis geniculata (moss)

Results of Pre-Disturbance Surveys

No conks of noble polypore were located; however stumps and snags searched in the area provide suitable habitat. No rare bryophytes or lichens were found during the survey.

The lichen community is only moderately developed and dominated by alecteroid (pendulous) and green-algal foliose taxa. Frequently encountered taxa include, *Alectoria sarmentosa, Bryoria* spp. *Hypogymnia* spp. and *Platismatia* spp. Cyano-lichens (nitrogen-fixing) are poorly represented and restricted to infrequently encountered thalli of terrestrial species in talus areas. The bryophyte community is also moderately developed and is dominated by terrestrial species. Commonly encountered bryophytes include; *Rhytidiopsis robusta, Dicranella varia , Dicranum* spp, *Racomitrium* spp.,. Talus areas exhibited the highest levels of species richness.

Known Site Management Recommendations

Zigzag and/or Clackamas River Ranger District records and the Inter-Species Management System (ISMS) were searched for Known Sites of Survey and Manage botanical species requiring management. No Survey and Manage Species within the project area or adjacent to the project area which will be affected by project activities were found.

Noxious Weed and Invasive Non-Native Species Risk Assessment

Noxious weeds and invasive non-native plant species have been introduced to North America intentionally or unintentionally from other countries. The associated natural predators and diseases that controlled them in their native lands are not present in the United States. As non-native plant infestations increase, they threaten biological diversity and rare habitats, and can alter ecosystem processes such as fire frequency and intensity, hydrologic cycles, and soil erosion rates. They can also poison livestock and reduce the quality of recreational experiences. There are an estimated 2,000 invasive and noxious weed species in the U.S and nearly 600 in Oregon.

Noxious weeds are nuisance species that are targeted for control by the Oregon State Department of Agriculture (ODA). In the 1998 Final EIS for Managing Competing and Unwanted Vegetation, the Forest Service established that coordinated efforts for noxious weed control are necessary to prevent adverse effects on the environment.

Forest Service Manual direction requires that Noxious Weed Risk Assessments be prepared for all projects involving ground-disturbing activities. For projects that have a moderate to high risk of introducing or spreading noxious weeds, recent Forest Service policy requires that decision documents must identify noxious weed control measures that will be undertaken during project implementation (FSM 2081.03, 11/29/95). To be in compliance with the EIS for Managing Competing and Unwanted Vegetation, it is also recommended the applicable portions of

Standard Procedures to Reduce the Risk of Spreading Weeds be implemented in all projects, regardless of weed risk ranking.

Regional direction for invasive plants was amended by the October 2005 Record of Decision for the FEIS on Preventing and Managing Invasive Plants (2005 ROD). This direction becomes effective on March 1, 2006. The standard procedures and project recommendations identified in this report are consistent with the management direction in the 2005 ROD. The measures for rock source management are outlined in Standard #7 (2005 ROD, Appendix 1-4). The measures identified below include all of the measures identified in this section of the 2005 ROD.

Risk Ranking

Factors and Vectors considered in determining the risk level for the introduction or spread of noxious weeds are:

FACTORS

A. Known noxious weeds in close proximity to project area that may foreseeably invade project.
B. Project operation within noxious weed population.
C. Any of vectors 1-8 in project area.

VECTORS

1. Heavy equipment (implied ground disturbance including compaction or loss of soil “A” horizon).
2. Importing soil/cinders/gravel/straw or hay mulch.
3. Off-road vehicles or all-terrain vehicles.
4. Grazing.
5. Pack animals (short-term disturbance).
6. Plant restoration.
7. Recreationists (hikers, mountain bikers, etc.).
8. Forest Service or other project vehicles.

High,-moderate,-or low-risk rankings are possible. For the high ranking, the project must contain a combination of factors A+C or B+C above. The moderate ranking contains any of vectors #1-5 in the project area. The low ranking contains any of vectors #6-8 in the project area or known weeds within or adjacent to the project area, without vector presence.

Weed Risk Ranking Results

Project	Factors	Vectors	Risk Ranking
	A, B, and C	1, 2, 6, and 8	High

Standard Procedures to Reduce the Risk of Spreading Noxious Weeds

1. Clean heavy equipment prior to arrival on Forest Service land to prevent introduction of new noxious weed seed. The contract administrator or project activity coordinator will

inspect all project equipment before it is allowed to operate at the project site. The equipment shall be free of soil clumps and vegetative matter or other debris that could contain or hold seeds. Cleaning of the equipment may include pressure washing and shall be done outside of the National Forest boundary.

2. If horses or pack animals are used, clean hooves and groom animals prior to arrival on site. Use weed-free feed for 3 days prior to arrival on site and throughout duration of project.

3. Save topsoil on site from areas to be disturbed and replace over disturbed soil before replanting.

4. If soil disturbance occurs, revegetate with site-appropriate, locally collected native seed or native plants. When these are not available, use noninvasive and nonpersistent non-native species. When seed is used it should be either certified noxious weed free or from Forest Service native seed supplies. Check with the District Botanist for appropriate species.

5. Protect soil from compaction by applying bark chips or straw mulch. If straw mulch is incorporated, use either mulch from fields that grow State of Oregon Certified grass seed (which is certified free of Oregon noxious weeds) or other sources that are determined to be free of noxious weeds. Mulch species shall preferably be from native seed sources or annual rye or cereal grain fields.

6. If gravel or soil is imported from outside of the project area, consult with the District Botanist to ensure that weeds are not introduced from the supply source.

Noxious Weed Survey Results
Noxious weed surveys were conducted beginning at Highway 26 at the north end, along both sides of USFS Road 2656 and Road 955 into the quarry, for a total of just over 3 miles. Numerous locations of several species were found and mapped. They are listed on the table below and marked on Figures 3 and 4.

Latin Name	Common Name	Location and Frequency
Cirsium arvense	Canada thistle	One small location, roadside near middle of quarry.
Cirsium vulgare	bull thistle	Few plants roadside in 3 locations, in south half of quarry.
Cytisus scoparius	Scot's broom	2 roadside plants: 1 at NW corner of quarry, 1 at SW corner
Digitalis purpurea	foxglove	2 roadside plants at NW corner of quarry, and one small population on west side of entrance road near Hwy. 26.

Hypericum perforatum	St. John's wort	Numerous scattered populations along entrance road. Two small roadside populations in south portion of quarry. Scattered elsewhere in quarry.
Lotus corniculatus	birdsfoot trefoil	Scattered populations along entrance road.
Phalaris arundinacea	reed canarygrass	One patch on east side of Road 2656 about 1/4 mile south of Hwy. 26. A second patch on west side of Road 2656, about 3/4 mile south of Hwy. 26.

Recommendations Special to this Project

1. Prior to project implementation, all identified noxious weeds should be removed. This includes pulling, bagging in plastic bags, and burying all noxious weeds including St. Johns wort and bull thistle. Scot's broom can be pulled or cut at the main stem at ground level. Scot's broom does not need bagging, only burying. If burying can be accomplished in the soil disposal area soon after bagging or cutting, all cut or bagged vegetation may be buried at the site.

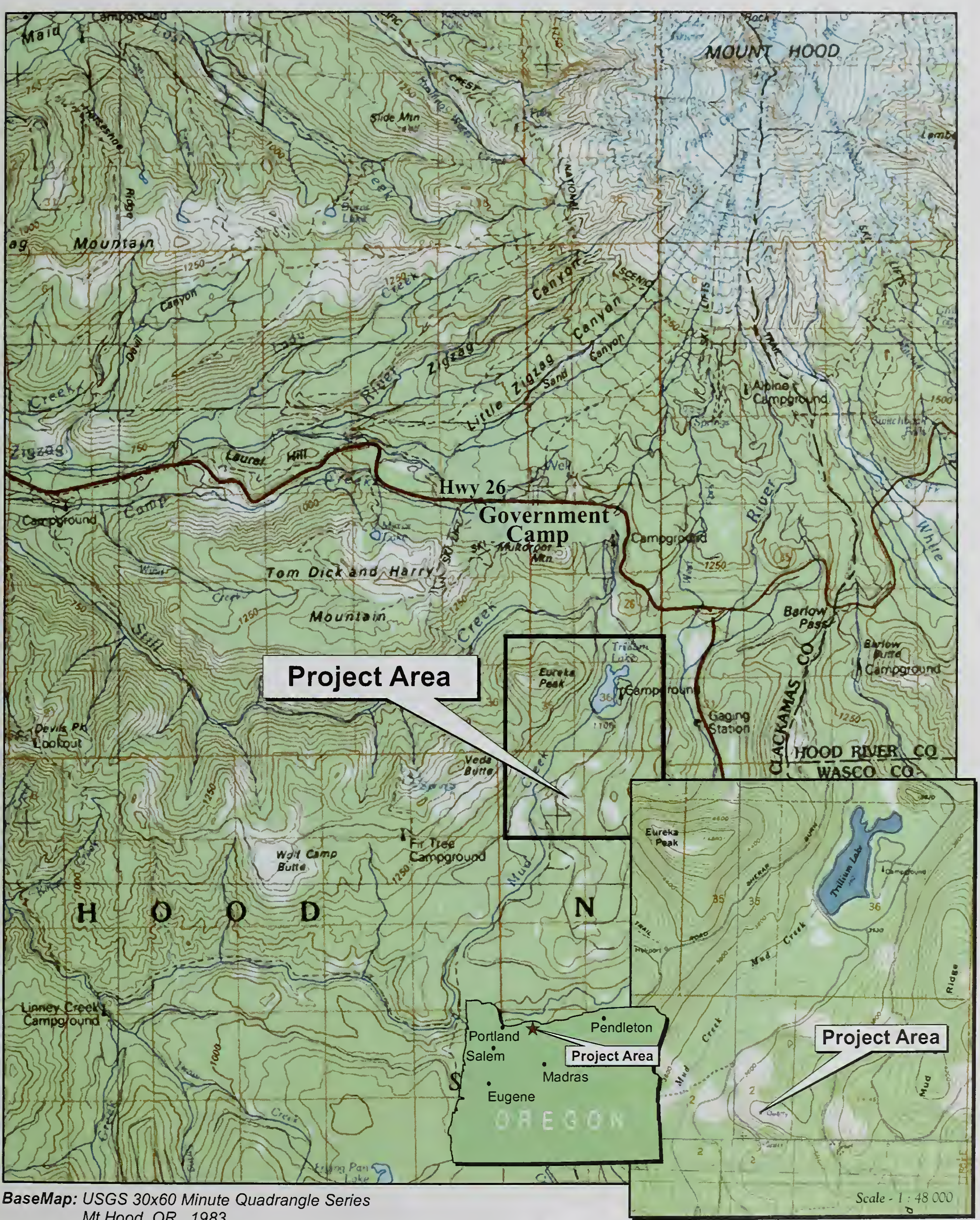
2. A FS botanist would survey the quarry annually for noxious weeds and would draft a report as to the findings. (Alternatively, a qualified botanist would conduct a survey and prepare a report for review and approval by a FS botanist.) Additional weed control (bagging, cutting, burying) would be done annually if justified by the botanist's report.

3. Heavy equipment brought to the quarry from off the Forest should be free of soil clumps and vegetative matter or other debris that could contain seeds prior to entering the Forest.

4. Should material from outside the Mt. Hood National Forest boundaries be imported to the quarry, a FS botanist would be consulted prior to the material being transported to ensure noxious weeds are not imported to the quarry.

5. To protect from erosion, all exposed soil areas would be seeded, mulched, and fertilized by September 30 of each year where the area is disturbed. Grass species used would comply with the Mt. Hood National Forest policy on the use of native plants and be certified free of Oregon and All States noxious weeds. Mulch would be applied to the entire seeded area and to consist of straw from fields that grow State-Certified grass seed (which is certified free of Oregon noxious weeds) or other sources determined to be free of noxious weeds. Mulch species preferably will be from native seed sources, annual rye, or cereal grain fields. Mulch should be applied at a rate of 3,000 pounds per acre.

/s/ David Lebo	1-25-06
David Lebo, Botanist	Date



BaseMap: *USGS 30x60 Minute Quadrangle Series*
Mt Hood, OR 1983

Inset Map: *USGS 7.5 Minute Quadrangle Series*
Mt Hood South, OR 1980; Government Camp, OR 1980;
Wolf Peak, OR 1985; Wapinitia Pass, OR 1985

Figure 1
Vicinity

Scale - 1 : 100 000

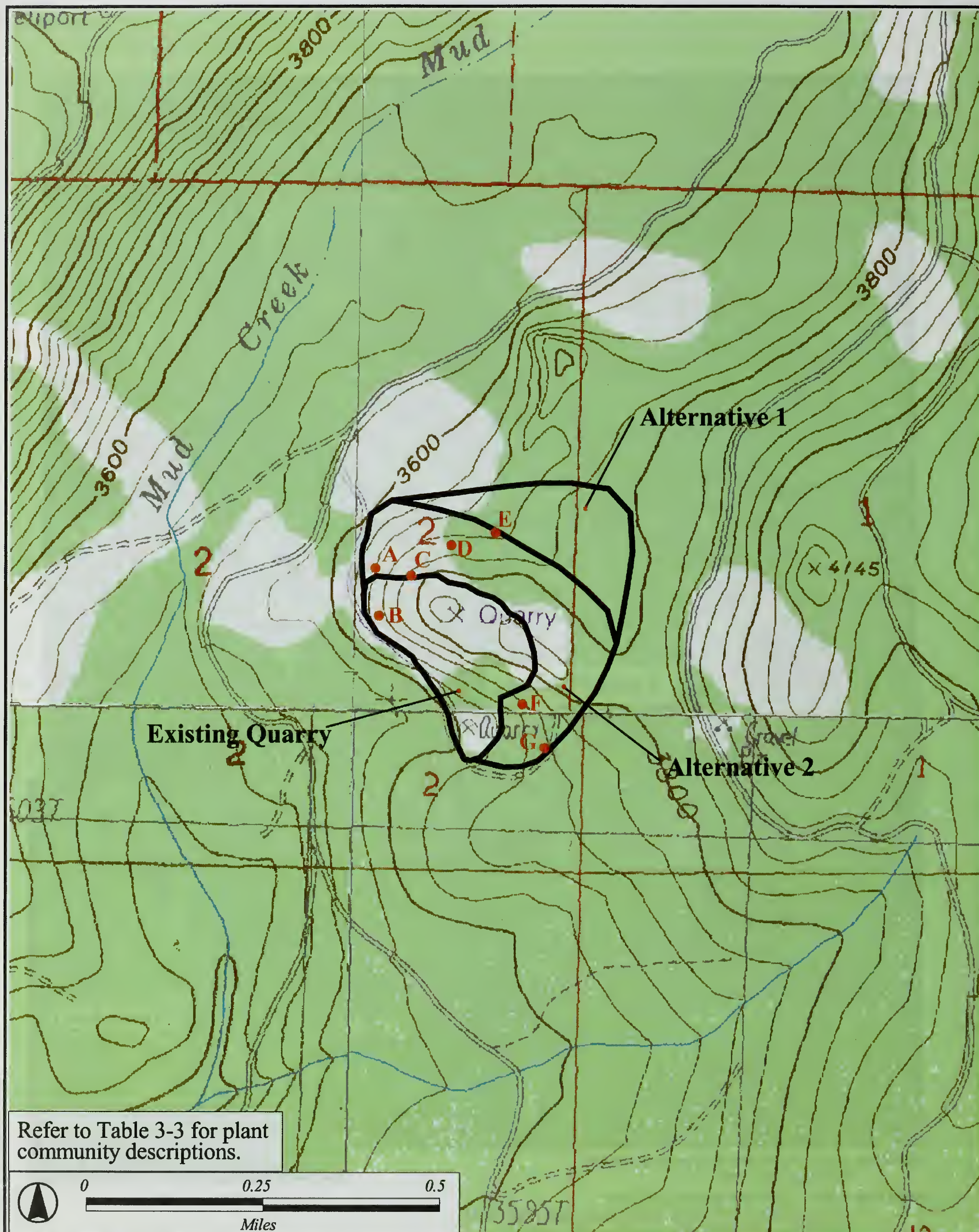


Figure 2

Vascular Plant Communities in the Tamarack Quarry Study Area

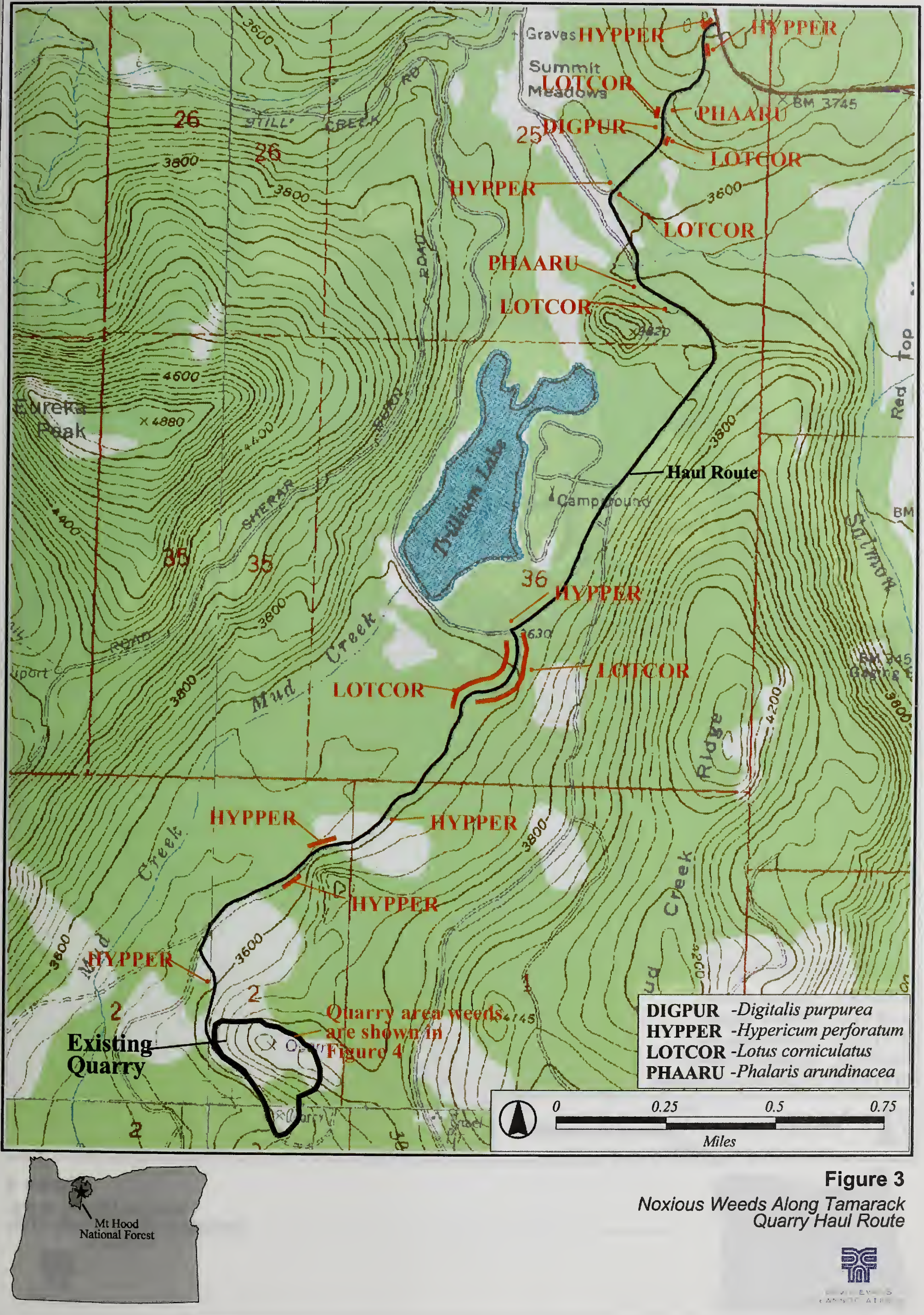


Figure 3

Noxious Weeds Along Tamarack Quarry Haul Route

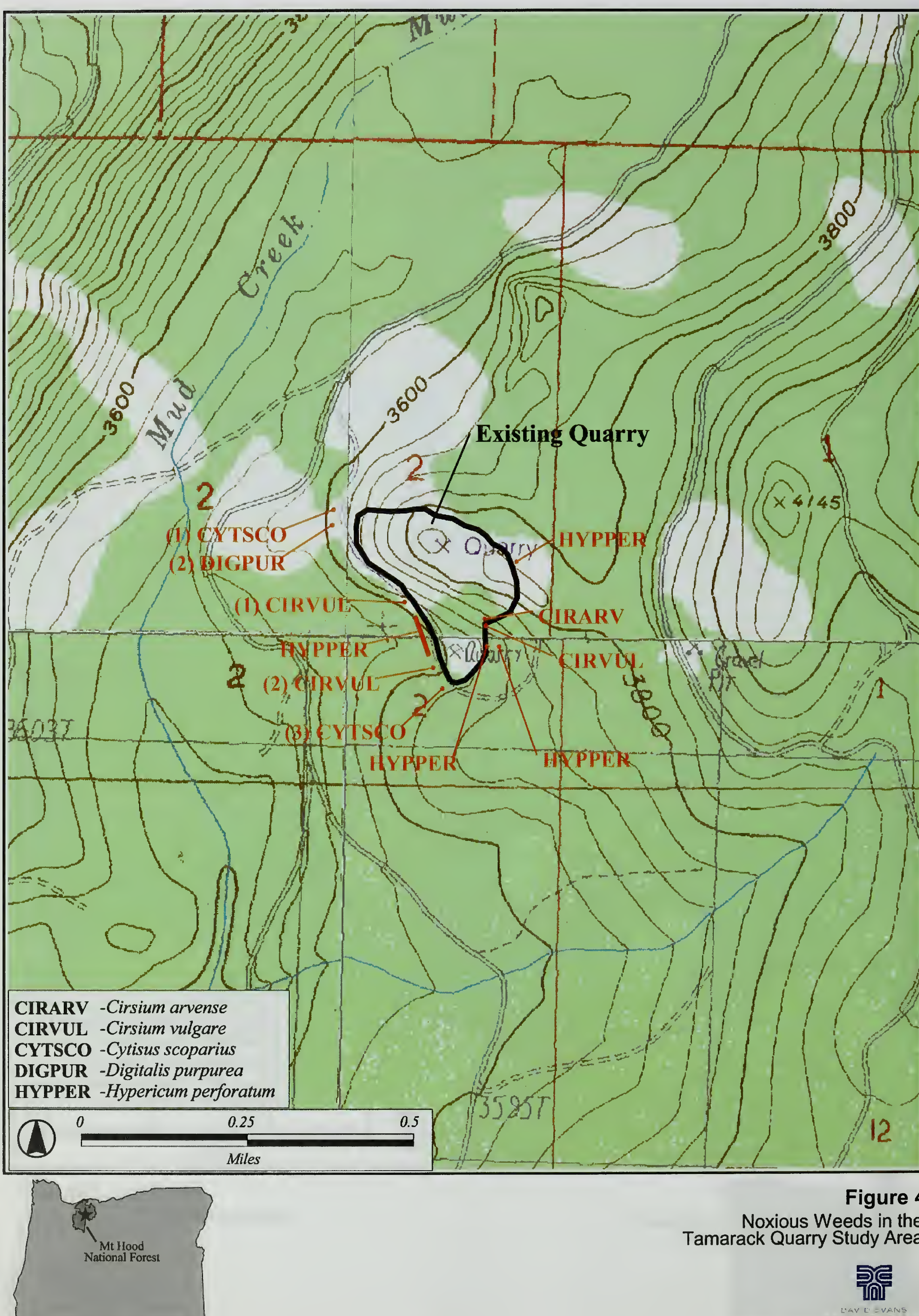


Figure 4
Noxious Weeds in the Tamarack Quarry Study Area

Appendix F: Responses to Substantive Comments

Changes between Draft and Final EIS:

- This entire appendix has been added

Response to Comments

The public comment period for the Draft Environmental Impact Statement (DEIS) for the Tamarack Quarry Expansion Project began on July 23, 2004 and ended on September 7, 2004. Individuals, interest groups, organizations, businesses, elected officials, state, local, and other federal agencies, and Tribes were invited to comment on the DEIS. Three letters and one electronic mail were received during the 45-day comment period.

All of the letters received during the public comment period were processed and the substantive comments were compiled into "comment statements." All comments were reviewed and the information provided in the letters was used during the preparation of the Final EIS. This appendix contains the comment statements and responses. The responses are intended to be explanatory in nature; if there are any inadvertent contradictions between this appendix and the text of the Final EIS, the Final EIS prevails.

The following comments were received from David Butt.

Comment A1: *Since day one this project seems to have been planned with the purpose of seeking the LEAST amount of public comment possible.*

Response: There has been no attempt to limit public comment on the proposed action. On January 15, 2002, and May 2, 2002, notices were published in the Federal Register seeking public comment on the project. The project was also listed in the Mt. Hood National Forest's quarterly publication that announces proposed actions in autumn 2002 thru summer 2005. This quarterly announcement is mailed to approximately 300 groups and individuals and is also available online. The proposed project was also posted on the Mt. Hood National Forest website. In addition, two open houses were held, offering the public opportunities to review and comment on the proposal. A notice of availability of the Draft DEIS was published in the Federal Register, and in The Oregonian. The DEIS was also mailed to all parties who provided comment on the proposal, listed in Chapter 10 of the DEIS.

Comment A2: *The historic name of this rock quarry (Mud Creek, after the creek that drained from Mud Lake, now Trillium Lake) changed during the initial stages of this project. It is highly possible that the thousands of year round recreation users of the immediate area, would not have a clue that as a result of this project they may be meeting 20 yard loaded trucks once every 2 minutes along the first 2 miles of FS Rd 2656. If folks (many in large RVs or hauling trailers) drive 30 mph, they could meet up to 3 trucks between turning off the highway and the Mud Creek Loop.*

Response: For years the rock quarry has been known informally as the Mud Creek Pit. When the initial proposal to expand the quarry was being considered, there was concern that there may be a public misconception about the appropriateness of expanding a quarry site in a place called "Mud Creek." The quarry is actually more than a mile away from the creek known as Mud Creek. To avoid misconception that the quarry might be within or near the creek, the name was changed to

Tamarack Quarry. The name change was described in a notice in the Federal Register and was also documented in the DEIS. The location of the quarry was also described in the public notices.

The average recreation visitor to the project vicinity is frequenting the recreation facilities around Trillium Lake and is likely not aware of the existence, location, or name of the quarry, which is about 2 miles farther down the road (FS Road 2656). However, we agree that the average recreation user would be concerned about increases in truck traffic on the road. This was one of the public issues addressed in the DEIS. The analysis in the DEIS recognizes that there may be impacts to recreation users and for that reason rock haul would not be allowed from Friday at noon to Monday at 7 am. Other mitigation measures, such as signing and traffic controllers, have also been developed to address concerns related to truck traffic and recreation use. Traffic of one truck every two minutes is a theoretical maximum (a worst case scenario) that would be expected to occur only rarely, if ever. A typical day of operation is expected to generate one truck about every 12 minutes (FEIS Section 3.4).

Comment A3: *It seems obvious that if some of those recreationalists who met the very few log trucks hauling this route this summer were asked about the potential of the MAXIMUM amount of rock haul over the next 20 years, you would hear some very strong concerns.*

Response: Early on in the planning process, the FS recognized that one of the main concerns about the proposal would be the potential impacts to recreation users. This was one of the main issues identified in the analysis, and mitigation measures have been developed to address such concerns. The potential conflicts between recreation and truck traffic would not be new. Although rock haul during the past summer (2004) was not heavy, there have been years in the past when large quantities of rock were removed from the quarry. Based on our past experience, the FS and ODOT have concluded that recreation impacts of rock haul can be managed with the mitigation measures that have been developed.

Comment A4: *The analysis of both the volume of rock haul and the hazards for recreational traffic has not been adequately addressed. The Trillium Lake Road from Hwy 26 to the Dam, has poor sight distance on curves, is narrow, has soft shoulders and feels like it's already a safety hazard when heavy traffic is flowing in both directions. How can such heavy truck use of this recreation road be planned WITHOUT improving the road itself, both for safe recreation travel and bicyclists? In addition to not hauling on weekends and holidays, the road and shoulder should be widened and limits imposed on haul speed and the use of exhaust brakes.*

Response: Transportation engineers from ODOT, FS, and a consulting firm conducted an on-site analysis of the roadway to determine its condition. Their opinion was that the road is adequate, with implementation of proper traffic control, to serve the proposed traffic. The road would not be widened, thus avoiding additional environmental impacts, but the road would receive maintenance including resurfacing when needed as well as traffic control measures such as signing and speed limits.

Comment A5: *To expect a new trail (from Gov Camp to Trillium) to maybe be constructed by summer 2008 (funded by ???) to reduce conflicts between vehicular and pedestrian/bicycle along the haul route (Trillium Lake to Highway 26) is wishful thinking. These unacceptable impacts need to be mitigated by the project causing them.*

Response: Several sources of funding were used for planning the trail from Government Camp to Trillium Lake. The decision for this trail was approved in January 2006. Funding from ODOT as identified in the mitigation measures will be used for the construction of this trail. Quarry operation/rock haul is not the only source of conflict between vehicles and pedestrians/bicyclists. Traffic conflict already occurs between recreation-related vehicular and pedestrian/bicycle traffic. Most conflict occurs and would continue to occur during weekends and holidays, when rock would not be hauled along the road.

Comment A6: *Alternative 1 fails to both consider other sources of rock for this purpose as well as to adequately contemplate sources of longer term need.*

Response: Other sources of rock were considered and are described in Section 2.3 of the DEIS (Table 2-3). Evaluating longer term sources at this time would be highly speculative and possibly unrealistic since it would be very difficult today to predict the amount of rock that may be needed 30 or 50 years from now. It is not feasible to predict the modes of transportation or alternative materials that may be available that far into the future. However, having an available source of material for at least 20 years will allow time for other sources or alternative materials to be developed.

Comment A7: *Having attended the open house in 12/02 when the initial purpose of the project appeared to be providing ROCK for CONSTRUCTION projects ON FOREST, it was frustrating that there was no specific information available about the size (volume of haul) of the project. Now the project appears to be to provide ODOT and the FS with all of the rock they could possibly need on and off forest both for construction, maintenance and SANDING of our winter highways. Tamarack would be ODOT's major source of sand (which does not require this quality of rock) for ODOT. There appears to be a choice of either providing quality rock for the forest for the next 75 years or providing adequate rock for both the forest and ODOT for the next 20 years. Where will the need for this nonrenewable resource be met after the life of this quarry?*

Response: The original purpose of the proposed action, as published in the Federal Register (January and May 2002), and as printed on materials presented at the public open houses, was to provide a long-term source of sanding rock, as well as construction rock, for both ODOT and the Forest Service, with an estimated need of approximately two million cubic yards over the next 20 years. The proposal has not changed since, and the description in the DEIS is consistent with the earlier publications. The original proposal also disclosed that Tamarack Quarry would be ODOT's major source of sanding material for highways near Mt. Hood because the previous source (White River quarry) is no longer available. Quality rock is needed for sanding roadways because softer rock would break down into small fragments too easily and not provide adequate traction in snow and ice.

Comment A8: *This DEIS considers the economic impact of this project in terms of commercial use of rock only. The economic value of the impacted recreational resource to the nearby communities is not considered. Government Camp is expanding as a visitor destination. Existing ski shops, lodging facilities and restaurants from Brightwood to Government Camp depend on a mix of winter recreation activities to draw visitors to the mountain. "Emergency" is not defined. If the last few major flooding events along Hwy 35 had constituted an "emergency" need for ODOT and plowing was allowed after the "first measurable snowfall" and before April 15 on Trillium Lake Road (Highway 26 to Mud Creek junction) winter recreation in the entire Trillium Basin would be eliminated (how can you ski or snowshoe a loop if ¼ of it is plowed to two lanes with turnouts???).*

Response: The proposed action does not include a proposal to increase or change emergency use of the quarry. Emergency use of the quarry is currently allowed under the current special use permit (i.e., under the No Action Alternative), so the project would not represent a change over the existing condition. Conversations with ODOT maintenance personnel confirmed that emergency use is expected to occur only rarely, and ODOT would likely pursue other rock sources before using Tamarack Quarry during the winter, primarily because plowing the road would be very expensive. To date, neither the FS nor ODOT have accessed the quarry during the winter, even for emergencies (Beckman, pers. comm., 2005). Prior emergencies such as White River (Hwy 35) occurred in the late fall months prior to snowfall. Should emergency use and plowing occur, it could negatively affect winter recreation in the area; however, as noted above, the Action Alternatives would have the same effect as the No Action Alternative.

Comment A9: *Since 1986, snowtrails in this area have been groomed through a unique partnership with the Forest Service, local ski shops, winter visitors and myself who volunteers to do the grooming. The Forest Service, Clackamas County Tourism Development Council and Clackamas County Department of Economic Development have recently invested funds to improve the area road system so that winter snow trails can be groomed with a minimum of snow with the goal of increasing skier and snowshoer, improving this attraction. Creative signing has been developed to encourage snow shoe and XC ski use on one route groomed for both uses, increasing the capacity while reducing conflicts. This provides a quality recreational opportunity and is generating more and more winter recreational interest and positive economic impacts to the nearby communities. It's ironic that this project isn't even mentioned in your text.*

Response: Comment noted. One of the needs for the proposal is the need for sanding material in the winter. Winter recreation is one of the primary reasons for sanding the highways around Mt. Hood. Sanding allows the public safer access to the many winter recreation opportunities in this area. Additional discussion about the importance of winter recreation has been included in the FEIS. The project would not adversely affect winter recreation in the area except during emergency use of the quarry, which is not expected to occur.

Comment A10: *No mention is made of the impact of this project on the private land owners in the Summit Meadow subdivision. Any plowing of the road or increased use of*

the gates (to keep folks out when the road is obviously plowed two lanes wide) will require a substantial investment in a gate system as well as coordination with the private land "in holders" so as not to impact their access.

Response: As noted above, the proposed action does not propose any change in the potential emergency use of the quarry. Plowing and winter rock haul on the road would occur only during emergencies and, as evidenced by the lack of such activity in the past, is not expected to occur. ODOT may request entry to the quarry as early as April. If the FS approves the request, ODOT would have to pay for plowing and traffic control. This could impact the late season use of winter recreation in the area and coordination with private land "in holders" would occur.

The following comments were received from Oregon Natural Resources Council (ONRC) and BARK.

Comment B1: *(W)e need more convincing that the expansion of the Tamarack Quarry is needed for these purposes. Is it possible that ODOT and USFS will burn through two million cubic yards of rock in just 20 years for routine sanding, maintenance and repair? The DEIS (pg. 1-4) states "ODOT and the FS estimate that more than two million cubic yards of rock would be needed over the next 20 years for highway and road maintenance, construction, and emergency repairs, as well as for road closures and stream and other site restoration projects in the Mt. Hood area." USFS has an obligation to demonstrate this need with evidence. In the final EIS, USFS must provide us with an accounting of the use of rock by ODOT and the USFS for sanding, maintenance, and repair over the last 20 years in the vicinity of the quarry to demonstrate that two million cubic yards of rock are needed for these purposes.*

Response: Additional discussion and data has been added in the FEIS. As stated in Section 1.4 of the DEIS, ODOT (Regions 4 and 6) has historically utilized and predicts to continue to need approximately 37,000 cubic yards of material each year for sanding Mt. Hood area roadways (Hays, pers. comm., 2005). Planned road improvement projects and repairs would require an additional approximate average of 32,000 cubic yards of material each year (Hays, pers. comm., 2005). The FS predicts a need of 10-15,000 cubic yards of material per year for routine maintenance of existing FS roads based on past use of the pit. Tamarack quarry is the only quarry capable of providing a100,000 cubic yards of rock per year. Additional discussion on the estimated needed quantities is included in the FEIS (Section 1.5).

Comment B2: *There are other uses for rock that are more controversial, for which use of a nationally owned resource is not appropriate and highly controversial. New road construction, reconstruction and maintenance for the purpose of logging operations as well as highway widening do not enjoy the same broad level of support as road and highway maintenance, sanding and repair. New development in and around Government Camp will spur more road construction, and we are very concerned about the development's impact on the recreational infrastructure, wildlife, water quality, and ability of the Forest*

Service and other agencies to ensure that fire plays its natural role while keeping homes and communities safe. Any project that enables these controversial projects to move forward by providing resources required for their implementation must include a full accounting of their impacts.

Response: This proposal does not include or trigger any new road construction or highway widening. If there are proposals in the future for new road construction or highway widening on public lands, those projects and their environmental impacts would be evaluated in an environmental analysis consistent with the National Environmental Policy Act, including the opportunity for public review and comment.

Comment B3: *Removing, processing, and hauling two million cubic yards of rock from a single source for 20 years creates an enormous footprint on the land. USFS has discussed and disclosed many of these impacts in the DEIS. We understand the need for local material that is not prohibitively expensive to agencies supported by taxpayer dollars in order to promote the safety and welfare of travelers in and around the Government Camp area. However, we want to ensure that this project is truly needed, its impacts fully disclosed as well as minimized, and the material taken from the quarry utilized for the best interests of the public. We need to see data that demonstrates how the 750,000 cubic yards of rock currently in the quarry area without expansion are not adequate.*

Response: Based on the estimates of rock needed by the Forest Service and ODOT, the 750,000 cubic yards of rock would supply rock for approximately the next seven years but would not meet the need over 20 years. See also response to Comment B1.

Comment B4: *USFS does not disclose that significant Wilderness suitable lands near the project area are being considered for Wilderness designation. This is the first seriously considered Wilderness proposal on the Mt. Hood National Forest since the 1984 bill. This is significant new information the USFS should consider. On page 3-43 of the DEIS, USFS only considers the visual impacts on the Sherar Burn road, stating, "the proposed expansion would create more of a visual impact to users' expected wilderness experience on the way to the actual wilderness area. However, only approximately two percent of visitors to the Salmon-Huckleberry Wilderness use Sherar Burn Road. Therefore the impact is considered to be minor." However, USFS should disclose the impacts to visual resources from proposed Wilderness areas, as well as disclose that there will likely be an increase in use of the Sherar Burn road if more wildlands are protected as Wilderness on the east side of the Salmon Huckleberry Wilderness. Several of these areas are within a mile of the proposed quarry expansion, and the impacts on solitude from blasting and crushing activities were not described or disclosed in the DEIS.*

Response: At the time the DEIS was prepared, legislation for new wilderness areas near Mt. Hood had not been proposed. The project area is not within or adjacent to the area that was proposed by Senator Wyden in 2004 as new wilderness. The quarry would be approximately a mile to the west of a portion of that area. There have been discussions about a potential proposal for a new wilderness area between members of the Oregon delegation and the public, but at the present time there are no proposals in Congress. It is

anticipated that sound from blasting would carry to the south of the quarry not to the east toward this area. Topography (ridge lines) of the areas to the east of the quarry should protect any new proposed wilderness from noise carry from the quarry. Additional discussion on this issue has been included in the FEIS (Section 3.11).

Comment B5: *Notwithstanding future Wilderness designation, there are also impacts for current levels of recreation in the area. To have as many as 285 trucks per day (table 3-1) rattling past Trillium lake in the summer will likely displace some campers, boaters, and anglers, increasing use and impacts in other lakes in the area. As USFS notes in the DEIS, there are a number of "safety issues due to lack of off-road pedestrian and bicycle facilities." There is a lack of analysis in the DEIS about these impacts to Trillium Lake and discussion on how to mitigate them in the lifetime of the quarry use. While much of the use of the Trillium Lake area is on the weekends, as is most recreation on the forest, there is use during the week and USFS and ODOT should develop mitigation plans to avoid conflicts between recreaters and rock haulers.*

Response: The 285 trips per day estimated in the DEIS was a theoretical maximum that is unlikely, if ever, to occur. A typical day of operation would be closer to 50 trips. There is no indication or evidence that operation of the pit would actually displace users at Trillium Lake. The quarry has been in use for over 50 years, and there is no indication that past use, even when heavy, has resulted in displacing users. The analysis does recognize the potential impacts on recreation in this area and mitigation measures have been developed to reduce conflicts between recreation users and rock hauling.

Comment B6: *(I)s it not likely that revegetation efforts will be very slow after the quarry is "rehabilitated"? As USFS notes in the DEIS, "although the visible clearcuts were harvested 10 to 20 years ago, they have been slow to revegetate, and still present a contrast in color" (3-10). Given that the quarry site is not only going be stripped of vegetation, but stripped of soil and rock before the soil is replaced and the site replanted, won't rehabilitation be difficult? Will adequate funding over a sufficient period of time to promote successful revegetation of the site? The DEIS states "contrasts in color would likely become negligible as the reclamation plan to establish vegetation is successfully executed" (3-8). Yet given the lack of success of revegetating disturbed soil in the project area, isn't the success of this reclamation plan speculative? USFS says that when it comes to revegetating the quarry, planting methods and times would also be "in accordance with FS recommendations" (DEIS, 2-4). Weren't the unsuccessful planting efforts on the plantations in the project vicinity also planned to meet FS recommendations?*

Response: The existing clearcuts are on a ridge that faces Timberline Lodge, and are, therefore, entirely visible from the lodge. Tamarack quarry is not currently visible due to it's location behind a ridgeline. The quarry would be expanded in such a way as to preserve the ridge that currently is screening the view from the lodge. The clearcuts have been revegetated but are growing very slowly due to poor site conditions. Growing conditions at the quarry are more favorable as evidenced by two areas of revegetation adjacent to the quarry that are showing vigorous and healthy growth. The quarry, when revegetated, would likely grow slowly due to the impacts of the rock removal but the resulting contrast in

texture and color would be different than those of the clear cut and would more closely resemble a lake or meadow when viewed from Timberline Lodge.

Comment B7: *The DEIS does not spell out how reclamation would occur, only that it "would be developed" and "coordinated with USFS wildlife biologist to meet wildlife goals." USFS must disclose detailed plans available for public review. USFS must not downplay certain impacts with speculative mitigation. While USFS does say that reclaimed areas would need to have a "natural appearance" before new areas are opened and become visible form Timberline lodge (3-11). However, what is a "natural appearance"? Taken in context with the descriptions of the quarry opening looking like Trillium Lake, we are concerned that a "natural appearance" means something very different to the USFS than it means to us. But more important, the lifespan of an expanded quarry is supposed to be 20 years. Many clearcuts in the vicinity have responded poorly to revegetation efforts in this same period of time. How will one stage of the quarry be revegetated in just a fraction of the time in time to keep rock production moving? Given the consistent need for rock suggested by the DEIS, how is it possible that adequate rehabilitation will take place in time for other sections of the quarry to be expanded?*

Response: Additional information on reclamation has been added in the FEIS. A detailed reclamation plan can be found in Appendix G. As described in the plan, revegetation would occur in stages but revegetation of one stage is not required before more excavation can begin. The plan would be updated as each project entry occurs and to the extent possible revegetation of any portion of the quarry no longer needed would occur. The term" natural appearance" applies to the revegetated areas having the appearance as the surrounding landscape of trees and shrubs as seen from Timberline Lodge.

Comment B8: *In the DEIS (pages 3-35 and 3-36), USFS admits that soil conditions would be severely diminished, making the site incapable of supporting forest vegetation for many decades. Conversion of the site to a non-productive status would add 28 acres of acre (sic) currently in a non-productive condition. On page 3-39, the DEIS says that invasive weeds should be removed, not shall be removed. How will sufficient resources be available to monitor and remove invasive weeds?*

Response: Operating plans for the quarry would require ODOT to remove noxious weeds from the quarry activity areas before operations begin. Botanists from the Forest Service would monitor the areas for the presence of noxious weeds.

Comment B9: *How is it possible for the USFS to "rehabilitate" portions of the quarry in just a few years so they will not be picked out from the surrounding forest when viewed from Timberline Lodge?*

USFS suggests that the "form, line, and texture of the proposed expansion would be generally consistent with other openings in the viewshed," and the quarry openings would mimic the appearance of Trillium Lake in winter conditions" (DEIS, 3-8). A flat clearing may appear to be a lake in the distance, but it is not a lake. There can be no doubt that some the openings in the area are an embarrassment to the USFS (hence Abbot Salmon). Mimicking more of these

openings is not sound stewardship of the scenic resource from Timberline lodge and other vistas. It must be noted that the existing quarry area is not visible from Sherar Burn, Salmon River corridor, or from Trillium Lake.

Response: The appearance of the rock pit if expanded to the full extent would not mimic the older timber harvest units on the hillside as seen from Timberline Lodge. This is because of the angle of the viewer position and the location of the quarry on the landscape. As modeled in the DEIS the quarry would have the appearance of a lake or meadow. The DEIS notes that the existing quarry is visible from Sherar Burn, but not from the Salmon River corridor or Trillium Lake (Section 3.3).

Comment B10: *A project that removes two million cubic yards of rock is bound to have some consequences to water resources. The DEIS does describe some of these impacts, but fails to put their impact in a broader context. For example, on page 3-43, USFS describes how channels may form due to increased surface flow, altering the water storage capacity of a swale, which in turn could eliminate seeps and vernal pools in the area and the sediment storage capacity of the swale. How will this impact the sediment regimes in the downstream channels? What impacts on local aquatic and terrestrial organisms will this have? Are there aquifers that would not get recharged? What will be the impacts to different plant communities in the area? How will these impacts be mitigated during operations and reversed following operations?*

Response: The project is not expected to impact downstream channels, aquatic habitat, or aquifers due to the distance from these features and the erosion control methods that would be in place during and after operations. The reclamation plan has detailed erosion control standards which would be updated at each stage of entry. Some impacts are unavoidable and not reversible and a discussion of those impacts is in Chapters 5 and 7.

Comment B11: *The proposed quarry expansion is designated as B-2. The LRMP, section B-2-008 states, "No more than 5% of an activity area should be in a detrimental soil condition from the combined impact of compaction, puddling and displacement." We do not see how it is possible for the USFS to meet this standard and the DEIS section 3.13.2.1.2 on the Mt. Hood National Forest LRMP fails to discuss this standard.*

Response: Mt. Hood National Forest LRMP Standard and Guideline B-2-008 pertains specifically to "recreational livestock" activities and not quarry development (Forest Plan page Four-221). The DEIS recognizes that development of the quarry impacts soil resources over the entire activity area since removing the soil is necessary to access and remove the rock.

Comment B12: *The USFS has not given any indication that it has conducted its required population monitoring of MIS. The DEIS states only that deer and elk rearing areas are over a mile away from the quarry and are not expected impacted by project activities, (3-22) some summer thermal cover and foraging habitat for deer and elk will be impacted (3-20), that some of the large diameter snags that are to be felled and removed would provide habitat for the marten and the pileated woodpecker (3-20), and that the forest in Community E is old*

[illegible]

Appendix G: Reclamation Plan

Changes between Draft and Final EIS:

- This entire appendix has been added.

Quarry Development Plan

Tamarack Quarry Expansion Project

Mt. Hood National Forest

US Department of Agriculture, Forest Service
Mt. Hood National Forest

September 2005

Table of Contents

1 INTRODUCTION

The US Forest Service (FS) requested that Thomas G. DeRoo, a Mt. Hood National Forest geologist, complete a development plan for the proposed Tamarack Quarry expansion. This report contains a general development plan, spill plan, and rehabilitation plan for the quarry. This report is part of the environmental impact statement prepared by David Evans and Associates, Inc. for the Tamarack Quarry Expansion Project on the Mt. Hood National Forest.

Although this general development plan, spill plan, and rehabilitation plan considers the total development of the quarry, it is important to note that these plans are required to be updated at each expansion of the existing quarry. As expansion occurs better information concerning topographic contours, source rock location, and rock quantity can be obtained that will further refine these plans. Therefore these plans, which are based on the best available information, are not intended to be the final plans for all future expansions. They are intended to be updated as expansion occurs.

The discussions, maps, and cross sections in this report apply directly to Alternative 2 of the DEIS because this is the area of the quarry that would be developed first under either of the action alternatives and is the area where the best current information is available. The discussions, maps, and cross sections would be very similar for Alternative 1, except that the area covered would be slightly larger. As expansion occurs better information on the additional area in alternative 1, which is the expansion furthest out into the future, would be obtained and the discussions, maps, and cross sections can be further refined.

2 LOCATION

Tamarack Quarry is located on the Mt. Hood National Forest, in the northern Oregon Cascade Range. The legal location is Section 2, Township 4 South, Range 8.5 East, Willamette Meridian. The quarry is 3.6 miles south of the town of Government Camp and about 4 road miles south from Oregon State Highway 26. FS Roads 2656 and 2656955 provide access to the quarry.

3 EXISTING QUARRY DEVELOPMENT

FS records suggest that the quarry was first opened in 1957 and an estimated 450,000 cubic yards of material have been removed during the last 48 years. The primary users have been the FS and the Oregon Department of Transportation (ODOT) for road projects.

The existing quarry was developed in a logical and orderly fashion that has facilitated safe quarry operations, minimized environmental impacts, and allowed for continued development. The development history of this quarry is a result of long-term cooperation between the FS, ODOT, and contractors working for each agency, all of whom recognize the value of following current best management practices regarding quarry development and erosion control.

The FS and ODOT have historically used this quarry to produce a wide variety of rock products: highway sand, paving rock, surfacing rock, and riprap. Different projects have different requirements for types of rock products.

Figure 1 contains a plan map of the quarry site at a 1:3000 scale, showing the existing quarry and the surrounding area. The quarry is accessed from the northwest by FS Road 2656955. The quarry consists of two operating or working levels: a lower working area at 3640 feet elevation and an upper working area at 3760 feet elevation. Two quarry roads connect the two working levels. A third quarry road goes east from the lower working area and then curves north to the top of the upper quarry face.

All quarry roads are water-barred to minimize soil erosion. Storm water is directed to and collects at the low area near the south end of the lower working area. Surface runoff from the quarry does not reach any stream. Mud Creek is the closest perennial stream and is one-quarter mile downslope from the southeast edge of the quarry.

Overburden soils have been stockpiled northeast of the upper quarry face and the upper quarry road.

Recent quarry operations have been concentrated at the east end of the upper working area. Quarry faces in this area have been excavated to create benches that are a minimum of 20 feet wide and a maximum of 30 feet high with a maximum backslope ratio of ¼:1.

The existing quarry is completely screened by natural vegetation and existing landforms from nearly all viewpoints and from the key observation point at Timberline Lodge.

4 PROPOSED QUARRY EXPANSION

With Alternative 2, the Tamarack Quarry would be expanded by approximately 21 acres for a total area of approximately 50 acres. Figure 2 contains a plan map of the proposed quarry expansion at a 1:3000 scale, showing the proposed development limits and the surrounding area. Figure 3 contains two cross sections that depict the excavation limits of the proposed expansion, also at a 1:3000 scale.

With Alternative 1, the quarry would be expanded by approximately 48 acres for a total area of approximately 70 acres. The additional expansion beyond the Alternative 2 proposal would occur to the northeast. The development plan, cross sections, and rehabilitation plan for Alternative 1 would be very similar to those items depicted in Figures 2, 3, and 4 for Alternative 2, with the only difference being an enlargement of the excavation area to the northeast.

The FS and ODOT would continue to use this quarry to produce a wide variety of rock products: highway sand, paving rock, surfacing rock, and riprap. Each project will require its own unique assortment of rock products.

The expansion of the quarry would occur over the next 20 years or longer, as rock is needed. The quarry would continue to be accessed from the northwest by FS Road 2656955.

4.1 DEVELOPMENT PLAN

Tamarack Quarry contains good quality rock with variable fracture spacing and patterns. The variable fracture pattern creates zones that can be exploited for various rock products. One portion of the quarry may have a wide fracture spacing that can be utilized for riprap. Another portion of the quarry may have a tighter fracture spacing that would best be utilized for highway sand. Before any detailed development plan is formulated, a program of exploratory core drilling will be completed by ODOT in coordination with the FS. This will allow subsurface mapping of rock quality variations that will be essential knowledge before the creation of a detailed overall development plan and individual project development plans.

The quarry will continue to consist of two operating or working levels to maintain flexibility in locating individual project operations. Two quarry roads that connect the two working levels will be maintained and relocated as the shape of the quarry changes. The third quarry road that provides access to the top of the upper quarry face will be rerouted as the location of the upper quarry face changes.

All quarry roads will be water-barred to minimize soil erosion. Storm water will be directed to an enlarged settling pond at the low area near the south end of the lower working area, as indicated on Figure 2. A vegetated storm water control berm, constructed from overburden, will be maintained along the southwest edge of the lower working area to provide erosion control.

Overburden soils will be placed in three overburden stockpile areas as indicated on Figure 2. These stockpile areas will be outside any planned excavation area and will serve as long-term storage sites for overburden soils. These overburden stockpiles will be revegetated to prevent erosion.

The general sequence of excavation will consist of the following:

- expand the upper working area and face to the southeast, to the expanded development limits, after removing and stockpiling overburden
- lower the upper working area by 30 feet
- rehab the portion of the southeast face that is at final contours
- repeat the previous two steps until upper working area reaches elevation of lower working area
- expand northeast quarry face to the northeast, to the expanded development limits, after removing and stockpiling overburden, establish a new upper working area
- lower the upper working area by 30 feet
- rehab the portion of the northeast face that is at final contours
- repeat the previous two steps until upper working area reaches elevation of lower working area
- expand northwest quarry face to the northwest to the expanded development limits, after removing and stockpiling overburden, establish a new upper working area
- lower the upper working area by 30 feet
- repeat previous step until northwest portion of quarry is at final contours
- final rehab of quarry

Each individual project will have its own development plan with specifications tailored to that project operation. The project development plan will be designed by either FS; ODOT, with review by FS; or a contractor, with review by ODOT and FS. Example ODOT specifications are contained in Attachment A.

Some of the relevant ODOT contract specifications that relate to development plans are included below. See Attachment A.

00160.40(d)	Site Specific Requirements
00280.02	Erosion and Sediment Control Plan

FS projects would use contract specifications that are equivalent to the ODOT contract specifications listed above.

4.2 SPILL PLAN

Each individual project will have its own spill plan, included as part of the project development plan.

Some of the relevant ODOT contract specifications that relate to spill plans are included below. See Attachment A.

00160.40(d)	Site Specific Requirements
00280.02	Erosion and Sediment Control Plan
00290.20	Hazardous Waste and Hazardous Substances
00290.30	Pollution Control
00290.30(b)	Pollution Control Plan

FS projects would use contract specifications that are equivalent to the ODOT contract specifications listed above.

4.3 REHABILITATION PLAN

Figure 4 depicts the conceptual final contours of Tamarack Quarry after all excavation work has been completed. Actual final configuration of the quarry will be designed as the quarry is developed based on the horizontal and vertical extent of the rock resource in conjunction with site specific constraints related to noise, visuals, revegetation, erosion, reclamation, future use, and other factors.

Each individual project will have its own rehabilitation plan with specifications tailored to that project operation. The project rehabilitation plan will be designed by either FS; ODOT, with review by FS; or a contractor, with review by ODOT and FS.

As the quarry is expanded, more and more area will become available for reclaiming. As these areas become available a reclamation plan for that area will be included in the project plans and implemented as part of that project.

Three long-term overburden stockpiles are depicted on Figure 2. Some material from these stockpiles will be pushed back into the quarry benches and floor and be evenly

distributed over the quarry area as part of a project reclamation plan. Waste rock will be stacked against the base of the quarry face before being covered with overburden soils.

Reclaimed areas of the quarry will be stabilized against surface erosion by seeding, mulching, and tackifying as directed in the project reclamation plan. Plantings will be of native grasses and other native vegetation. Specialists will be engaged to plan and direct the revegetation portion of the reclamation.

The project reclamation plans will follow the water and erosion control, soil salvage and replacement, and land shaping and revegetation best management practices described in the Oregon Department of Geology and Mineral Industry (DOGAMI) Mineral Land Regulation and Reclamation Program's manual for aggregate mines (Open-File Report O-96-2). A project reclamation plan will be submitted to DOGAMI as part of the Division 30 Operating Permit application.

Some of the relevant ODOT contract specifications that relate to rehabilitation plans are included below. See Attachment A.

00160.40(d)	Site Specific Requirements
00280.02	Erosion and Sediment Control Plan
00290.30(b)	Pollution Control Plan
01030	Seeding
01040	Planting

FS projects would use contract specifications that are equivalent to the ODOT contract specifications listed above.

The reclaimed quarry will be only barely visible from the key observation point at Timberline Lodge. Nearly the entire expanded quarry is screened by natural vegetation and existing landform.

5 INDIVIDUALS AND AGENCIES CONSULTED

Russell Frost, ODOT, January 28 and March 9, 2005, electronic mail.

6 LIST OF PREPARERS

Thomas G. DeRoo, Mt. Hood National Forest geologist is the principal author of this report.

7 REFERENCES CITED

Department of Geology and Mineral Industries (DOGAMI), 1996. Manual for Aggregate Mines (Open-File Report O-96-2).

Oregon Department of Transportation (ODOT), 2002. Standard Contract Specifications.

Oregon Department of Transportation (ODOT), 2004. Supplemental Contract Specifications SP160.

Each individual project will have its own development plan with specifications tailored to that project operation. The project development plan will be designed by either FS; ODOT, with review by FS; or a contractor, with review by ODOT and FS. Example ODOT specifications are contained in Attachment A.

Some of the relevant ODOT contract specifications that relate to development plans are included below. See Attachment A.

00160.40(d)	Site Specific Requirements
00280.02	Erosion and Sediment Control Plan

FS projects would use contract specifications that are equivalent to the ODOT contract specifications listed above.

4.2 SPILL PLAN

Each individual project will have its own spill plan, included as part of the project development plan.

Some of the relevant ODOT contract specifications that relate to spill plans are included below. See Attachment A.

00160.40(d)	Site Specific Requirements
00280.02	Erosion and Sediment Control Plan
00290.20	Hazardous Waste and Hazardous Substances
00290.30	Pollution Control
00290.30(b)	Pollution Control Plan

FS projects would use contract specifications that are equivalent to the ODOT contract specifications listed above.

4.3 REHABILITATION PLAN

Figure 4 depicts the conceptual final contours of Tamarack Quarry after all excavation work has been completed. Actual final configuration of the quarry will be designed as the quarry is developed based on the horizontal and vertical extent of the rock resource in conjunction with site specific constraints related to noise, visuals, revegetation, erosion, reclamation, future use, and other factors.

Each individual project will have its own rehabilitation plan with specifications tailored to that project operation. The project rehabilitation plan will be designed by either FS; ODOT, with review by FS; or a contractor, with review by ODOT and FS.

As the quarry is expanded, more and more area will become available for reclaiming. As these areas become available a reclamation plan for that area will be included in the project plans and implemented as part of that project.

Three long-term overburden stockpiles are depicted on Figure 2. Some material from these stockpiles will be pushed back into the quarry benches and floor and be evenly

distributed over the quarry area as part of a project reclamation plan. Waste rock will be stacked against the base of the quarry face before being covered with overburden soils.

Reclaimed areas of the quarry will be stabilized against surface erosion by seeding, mulching, and tackifying as directed in the project reclamation plan. Plantings will be of native grasses and other native vegetation. Specialists will be engaged to plan and direct the revegetation portion of the reclamation.

The project reclamation plans will follow the water and erosion control, soil salvage and replacement, and land shaping and revegetation best management practices described in the Oregon Department of Geology and Mineral Industry (DOGAMI) Mineral Land Regulation and Reclamation Program's manual for aggregate mines (Open-File Report O-96-2). A project reclamation plan will be submitted to DOGAMI as part of the Division 30 Operating Permit application.

Some of the relevant ODOT contract specifications that relate to rehabilitation plans are included below. See Attachment A.

00160.40(d)	Site Specific Requirements
00280.02	Erosion and Sediment Control Plan
00290.30(b)	Pollution Control Plan
01030	Seeding
01040	Planting

FS projects would use contract specifications that are equivalent to the ODOT contract specifications listed above.

The reclaimed quarry will be only barely visible from the key observation point at Timberline Lodge. Nearly the entire expanded quarry is screened by natural vegetation and existing landform.

5 INDIVIDUALS AND AGENCIES CONSULTED

Russell Frost, ODOT, January 28 and March 9, 2005, electronic mail.

6 LIST OF PREPARERS

Thomas G. DeRoo, Mt. Hood National Forest geologist is the principal author of this report.

7 REFERENCES CITED

Department of Geology and Mineral Industries (DOGAMI), 1996. Manual for Aggregate Mines (Open-File Report O-96-2).

Oregon Department of Transportation (ODOT), 2002. Standard Contract Specifications.

Oregon Department of Transportation (ODOT), 2004. Supplemental Contract Specifications SP160.

ATTACHMENT A

Oregon Department of Transportation Standard Specifications

ODOT Standard Specifications are available on-line at:

http://www.odot.state.or.us/tsspecs/2002-std-specs.htm

The ODOT standard specifications that are relevant to the expansion of Tamarack Quarry are listed below:

Section 00160		Source of Materials
	00160.40	Agency Furnished Sources
	00160.40(d)	Site Specific Requirements*
	00160.80	Requirements for Sources of Borrow and Aggregate
Section 00280		Erosion and Sediment Control
	00280.02	Agency Controlled Erosion and Sediment Control Plan
Section 00290		Environmental Protection
	00290.20	Hazardous Waste and Hazardous Substances
	00290.30	Pollution Control
	00290.30(b)	Pollution Control Plan
Section 00335		Blasting Methods and Protection of Excavation Backslopes
Section 01030		Seeding
Section 01040		Planting

* included on following pages

SECTION 00160 - SOURCE OF MATERIALS

Comply with Section 00160 of the Standard Specifications supplemented and/or modified as follows:

00160.40(d) Site Specific Requirements - The following Prospective Source(s) of materials that may warrant investigation and consideration for use by the Contractor on this Project is (are) as follows:

(Fill in the blanks with the appropriate information.)

- **Source Number** - OR-________________
- **Location** - Approximately ____ kilometers (____ miles) ___(insert location and direction here)___ on Highway __________ in the ¼ of Section ___, T. __(insert N. or S.)__ , R. __(insert W. or E.)__ W.M
- **Access** - Adjacent __(east, west, north, south)__ of MP ______ of the ________________ Highway
- **Available Area for Equipment Setup, Stockpiling, and Processing Aggregate**:

  - **Existing** - ______ hectares (_____ acres)
  - **Development** - ______ hectares (_____ acres)

If the Contractor elects to use the above-listed Agency furnished source(s), the following shall apply:

- Conduct operations within the source according to all applicable State, county, and federal mining laws.

(Fill in the blank with the appropriate agency. Select from the list below. Delete "Operating and Reclamation Plan" if not applicable. Remove the parentheses if used.)

- A copy of the ________________, DOGAMI Permit, (Operating and Reclamation Plan,) and the material source narrative for this source are available for inspection at the office of the Project Manager. The Contractor is expected to examine and become familiar with all documents. Operations within this source shall conform to the stipulations and conditions within these documents and to all of the requirements of the development plan and these Special Provisions.

(Use this list to fill in the blank above. Delete the list when finished.)

County Land Use Permit
Intergovernmental Agreement
Bureau of Land Management (BLM) Permit
United States Forest Service (USFS) Permit
DSL Permit
Oregon Department of Fish and Wildlife (ODFW) Permit

ATTACHMENT A

Oregon Department of Transportation Standard Specifications

ODOT Standard Specifications are available on-line at:

http://www.odot.state.or.us/tsspecs/2002-std-specs.htm

The ODOT standard specifications that are relevant to the expansion of Tamarack Quarry are listed below:

Section 00160		Source of Materials
	00160.40	Agency Furnished Sources
	00160.40(d)	Site Specific Requirements*
	00160.80	Requirements for Sources of Borrow and Aggregate
Section 00280		Erosion and Sediment Control
	00280.02	Agency Controlled Erosion and Sediment Control Plan
Section 00290		Environmental Protection
	00290.20	Hazardous Waste and Hazardous Substances
	00290.30	Pollution Control
	00290.30(b)	Pollution Control Plan
Section 00335		Blasting Methods and Protection of Excavation Backslopes
Section 01030		Seeding
Section 01040		Planting

* included on following pages

SECTION 00160 - SOURCE OF MATERIALS

Comply with Section 00160 of the Standard Specifications supplemented and/or modified as follows:

00160.40(d) Site Specific Requirements - The following Prospective Source(s) of materials that may warrant investigation and consideration for use by the Contractor on this Project is (are) as follows:

(Fill in the blanks with the appropriate information.)

- **Source Number** - OR-_________________
- **Location** - Approximately ____ kilometers (____ miles) ___(insert location and direction here)___ on Highway __________ in the ¼ of Section ___, T. __(insert N. or S.)__ , R. __(insert W. or E.)__ W.M
- **Access** - Adjacent __(east, west, north, south)__ of MP ______ of the ________________ Highway
- **Available Area for Equipment Setup, Stockpiling, and Processing Aggregate**:
  - **Existing** - ______ hectares (_____ acres)
  - **Development** - ______ hectares (_____ acres)

If the Contractor elects to use the above-listed Agency furnished source(s), the following shall apply:

- Conduct operations within the source according to all applicable State, county, and federal mining laws.

(Fill in the blank with the appropriate agency. Select from the list below. Delete "Operating and Reclamation Plan" if not applicable. Remove the parentheses if used.)

- A copy of the ________________, DOGAMI Permit, (Operating and Reclamation Plan,) and the material source narrative for this source are available for inspection at the office of the Project Manager. The Contractor is expected to examine and become familiar with all documents. Operations within this source shall conform to the stipulations and conditions within these documents and to all of the requirements of the development plan and these Special Provisions.

(Use this list to fill in the blank above. Delete the list when finished.)

County Land Use Permit
Intergovernmental Agreement
Bureau of Land Management (BLM) Permit
United States Forest Service (USFS) Permit
DSL Permit
Oregon Department of Fish and Wildlife (ODFW) Permit

- Hold a pre-work meeting at the material source prior to occupancy. Include the following owners or representatives:

(Fill in the blanks with the contact name(s) and phone number(s) as appropriate. Delete bulleted items that do not apply.)

  - Engineer
  - U.S. Forest Service representative(s)____________________________
  - BLM representative(s) ____
  - County ____
  - Other ____

- Coordinate source occupancy with the Engineer.

(Fill in the blank with the appropriate source information. Select from the list below.)

- The source _______________________ shall be as shown and as staked.

(Use this list to fill in the blank above. Remove "(s)" or parentheses as appropriate. Delete the list when finished.)

project boundary
excavation area(s)
reject fines stockpile
scalpings stockpile
oversize storage area
overburden storage area(s)
no work area(s)
storm-water control berm(s)
safety berm(s)
slash disposal area
log deck
bench and or access road(s)
stockpile and processing area

- Do not operate beyond the source project boundary or no work area(s) as shown and as staked.

(Fill in the blank with the appropriate source information. Select from the list below.)

- Provide proposed development plan and specification changes in writing for approval before making any changes to the source _________________________.

(Use this list to fill in the blank above. Remove "(s)" or parentheses as appropriate. Delete the list when finished.)

project boundary
excavation area(s)
reject fines stockpile

scalpings stockpile
oversize storage area
overburden storage area(s)
no work area(s)
storm-water control berm(s)
safety berm(s)
slash disposal area
log deck
bench and or access road(s)
stockpile and processing area

- Develop a site-specific Erosion and Sediment Control Plan for the source and submit to the Engineer according to 00280.02 at the time of the pre-work meeting or before. Construct the storm-water control berm(s) as shown and as needed to control runoff. Do not allow any materials, including sediments, aggregate or crushing by-products to enter into any waterway or wetland.

- Develop a site-specific Pollution Control Plan for the source, according to 00290.30(b), and submit to the Engineer at the time of the pre-work meeting or before. Include additional details on how the following will be addressed:

    - Do not discharge waste or by-product if it contains any substance in concentrations that could contaminate soils or result in harm to fish, wildlife, or water sources.

    - Store bag-house sludge, lime, and other potentially hazardous materials and solid waste in a manner that prevents seepage into the ground or groundwater sources. Lined sumps or pits are allowable options for storage. If pits or sumps are used, construct an adequate berm or other measure so that breaching of the pit will not occur.

    - For materials capable of causing water pollution if discharged, locate storage facilities so as to prevent spillage into any waterway or wetland that would result in harm to fish and wildlife or water sources.

- Using existing, loose and non-stockpiled material, construct a safety berm along the top edge of the excavation as shown. Maintain a 3 m (10 foot) buffer between the top edge of the excavation and the toe of the safety berm. Construct the berm 1 m (3 feet) high, with side slopes of 1V:2H.

- All vehicles, upon entering the site for the first time, and each subsequent time if the vehicle has left the roadway outside the project site, must be steam cleaned of all debris (soil, dirt, plant parts and vegetative matter) prior to being brought to the site, to prevent the spread of noxious weeds. Notify the Engineer in writing, prior to moving each vehicle onto the site, certifying that the equipment has been steam cleaned.

- Comply with any and all federal and State fire laws in effect at the time of source occupancy. Provide, operate and maintain wildland fire fighting equipment on-site at all times during any source operations.

- Protect cultural resources according to 00290.50.

- Do not utilize, contaminate, or disperse any aggregate in the existing stockpiles. If the present location of any stockpile interferes with the Contractor's operations within the source, move the stockpile(s) to another location within the stockpile area, as directed, at no additional cost to the Agency.

- Apply water to source access, haul road(s), and crushing operations to control dust.

(Use the following bullet when blasting restrictions are required. Fill in the blanks with the appropriate times.)

- Restrict blasting to the hours of ___:00 a.m. to ___:00 p.m. Monday through Friday. Do not blast on Saturdays, Sundays, or legal holidays as defined in 00170.65.

(Use the following bullet when these specific restrictions are addressed in land use or other permits. Remove "including drilling" when drilling and blasting is not required.)

- Mineral and aggregate extraction processing and equipment operation activities including drilling are limited to daylight hours Monday through Saturday unless modifications to these hours are requested in writing and approved by the Engineer. Do not conduct any operation on Sundays or legal holidays.

(Use the following bullet when needed. Modify as needed.)

- Prior to stripping soil, clear and grub all trees from within the excavation area and from the area to be developed for stockpile and processing as well as from the to be developed access road(s). Place all logs in the log decks and other woody debris in the slash disposal area as shown on the Plans.

(Remove "(drilling and blasting and)" when drilling and blasting is not required. Remove the parentheses when it is required.)

- Prior to (drilling and blasting and) excavating, strip and stockpile all soil overburden from within the excavation area and from the area to be developed for stockpile and processing as well as from the to be developed access road(s). Incorporate grass and small shrubs into the stockpiles; do not remove. Place stockpiles in the overburden storage area(s). Maintain a minimum 3 m (10 foot) buffer strip between the toe of the overburden storage area(s) and the excavation area. Overburden stripped from the stockpile and processing area shall be stored as shown, a minimum of 3 m (10 feet) from the toe of the aggregate stockpiles so contamination does not occur. Smooth and contour overburden storage berms to form side slopes no steeper than 1V:2H.

- Realign and regrade or construct the bench access road as shown. Construct this road with a 4 m (12 foot) width and a reasonably uniform grade, no steeper than 50% (1V:2H), for access to the upper bench by tracked vehicles.

- Construct the slopes, bench(es), and floor of the excavation area(s) as shown.

(Use the following bullets when drilling and blasting is required.)

[Begin Optional Drilling and Blasting Bullets]

- Perform all blasting within the source according to Section 00335, modified as follows:

(Use the following bullet when successful blast history of the source is available, otherwise delete this bullet.)

  - Delete subsection 00335.40(e).

  - Replace subsection 00335.40(f) with the following:

    00335.40(f) Blasting According to Plan - After the blasting plan has been reviewed, perform all blasting according to the plan.

(If specific fire precautions are required, fill in the blank with the name and phone number of the appropriate interagency notification centers. If specific fire precautions are not required, remove the third sentence.)

- Notify all adjacent residents and property owners a minimum of 48 hours prior to blasting. Give notice of the exact time of the blast to the Engineer a minimum of 48 hours in advance of the shot to schedule blasting activities. In addition, notify and obtain approvals from _______________. Do not detonate the shot until the person videotaping the shot is prepared, or until the Engineer gives approval to proceed.

[End Optional Drilling and Blasting Bullets]

- Stockpile scalpings and reject fines in separate and accessible stockpiles as shown.

(Remove "(s)" when only one exception is required. Remove the parentheses when additional exceptions are added.)

- At the completion of the operation, leave no loose material on the site exceeding 0.3 m (1 foot) diameter, except as noted below. Process existing oversize material, and all material loosened in the source by the Contractor that meets quality requirements, with the following exception(s):

(Fill in the blank with the appropriate quantity. Add additional bullets as needed.)

  - A maximum of _____ m^3 (______ cubic yards) of oversize material with a maximum dimension of 0.75 m (2.5 feet) may be stockpiled in the source on Agency property. All material shall be in a consolidated stockpile as shown.

  -

- Place any excess produced aggregate remaining at the end of this operation in separate and accessible stockpiles on Agency property in an area of the site designated by the Engineer, at no additional cost to the Agency.

- Leave the source haul road and bench access road open. Do not rip or block, with the exception of utilizing a few large boulders to block off access to the upper bench via the bench access road.

- Prior to demobilizing from the site, pile and burn all construction slash and combustible debris resulting from use and development of the source, including the preexisting refuse identified at the pre-work meeting, and even if outside the source project boundary. The only exception to this is grass and small shrubs incorporated into the overburden. Comply with any and all open burning regulations in effect at the time of source occupancy. If burning is not allowed, this material becomes the property of the Contractor, to be treated as noncombustible and removed from Agency property.

(Use the following bulleted item when placing reject fines on slope. Fill in the horizontal blank with appropriate number. Modify as needed.)

- Upon completion of the operations and prior to any final seeding and mulching, place reject fine material against the excavated slope as shown on the cross section(s) to construct the final 1V:___H slope. After the slope has been constructed with reject fines cover it with a minimum of 150 mm (6 inches) of scalping material and then evenly distribute the stockpiled overburden over the slope(s). If inadequate reject fines exist to completely construct the slope(s) utilize additional scalpings over top the reject fines to finalize construction of the slopes prior to the redistribution of overburden.

(Fill in the blank with the appropriate area information. Select from the list below.)

- Upon completion of operations in the source, stabilize the _______________ in addition to other areas within the site disturbed by the Contractor's operations, by seeding, mulching, and tackifying, as directed. Uniformly spread the following seed mixture:

(Use this list to fill in the blank above. Remove "(s)" or parentheses as appropriate. Delete the list when finished.)

excavation area(s) (if being reclaimed in the operation)
overburden storage area(s)
storm-water control berm(s)
safety berm(s)
soil/scalpings stockpile(s) as directed
bench and or access road(s)

(Insert seed mix and application rates here. Note: The seed mixture is almost always site specific. We do have four Agency approved generic lists based on geographic provinces that can be used (not shown here), but depending on what you are trying to accomplish, such as erosion control, wildlife forage, grazing, reforestation or something else, the mix may need to be developed specifically for the site. This can be accomplished by contacting a grass seed company and asking for assistance in developing a mix.)

(In the following bullet, include the second sentence when clover or alfalfa is required, otherwise remove it.)

- Utilize only certified weed free seed. Provide copies of the certification to the Engineer. Inoculate the clover and alfalfa prior to incorporation into the seed mixture.

- Straw mulch for non-hydroseeding applications (if this option is used) shall be grass straw from a certified field of bentgrass, bluegrass, fescue, ryegrass, or grain straw, singly or in combination. Provide copies of the certification to the Engineer. Straw shall not be moldy, caked, decayed, or otherwise of low quality. Straw shall be free of grass and weed seed.

- Ensure that no knapweed, thistle or other plant seed identified by the Oregon Department of Agriculture as a noxious weed appears in the mulch.

- Apply a commercial straw mulch tackifier according to the manufacturer's directions and at the recommended rate.

- Apply seed according to Section 01030.

- If the Contractor chooses, and conditions allow, this area may be stabilized by applying seed using a range drill with a roller attachment. Any areas seeded with the range drill and roller will not need to be subsequently covered with mulch and tackifier.

- Any variations require written approval.

- Prior to demobilizing from the site, remove all structures, noncombustible debris, and equipment from the site, even if preexisting. Bury nothing, with the exception of grass and small shrubs incorporated into the overburden.

- Prior to demobilizing from the site, remove solid waste and hazardous material from the site and dispose of properly. These include, but are not limited to, bag-house sludge or fines, lime, excess asphalt, materials placed in sumps, and truck cleanings. Provide documentary evidence of proper disposal and verify the amount of material removed.

- The Engineer will sample and test material after it is removed to assure compliance with DEQ regulations and to make sure that no material residue has been left behind. If test results show that material residue has been left behind, perform cleanup measures according to DEQ regulations.

- Prior to demobilizing from the site, hold a post-work meeting at the source to evaluate source rehabilitation work. Include the following owners or representatives:

(Fill in the blanks with the contact name(s) and phone number(s) as appropriate. Delete bulleted items that do not apply.)

  - Engineer
  - U.S. Forest Service representative(s)____________________________
  - BLM representative(s) ____
  - County ____
  - Other ____

- No separate payment will be made for source development, source use, or source rehabilitation as it is understood that payment is included in the listed Pay Items.

(Use the following bullet when cattle guards or livestock gates are present. Fill in blank with the appropriate location(s).)

- Maintain the cattle guard and livestock gate ________________ into the source at all times.

(Use the following bullet when fences are required to secure No Work Areas. Fill in the blanks with the length, type, and location of fencing.)

- Prior to any work, construct approximately ______ m (____feet) of type __________ fencing along ______________________ the no work area as shown and as staked. Absolutely no disturbance will be allowed in the no work area.

(Use the following bullet when road access is to be constructed.)

- Develop and maintain an access road from the developed stockpile and processing area to the newly developed excavation floor. Construct this road with a 4 m (12 foot) width and reasonably uniform grade, no steeper than a 16% grade (1V:6H), for access to the quarry floor. An approximate location for development of this road is shown on the sketch map. The exact location should be determined in the field and approved by the Engineer prior to construction.

(Use the following bullet when storm water berm is to be constructed.)

- Prior to any work, using existing, loose and non-stockpiled material, construct the storm-water berm. Any areas of the source disturbed during construction of the storm-water berm shall be developed and left level. Construct the storm-water berm 2 m (6 feet) high, with side slopes of 1V:2H. To provide erosion control to the storm-water berm, place (with minimal separation) 1 m (3 feet) and larger oversize material along the creek-side toe of the berm. Maintain a minimum 3 m (10 foot) wide buffer strip between the oversize material of the storm-water berm and the creek, as detailed on the cross sections and discussed at the pre-work meeting. Immediately after completion of the berm, seed according to this subsection.

(Use the following bullet when realignment and/or widening of existing access road is required. Insert the road name or number in the first blank and road name or access location in the second blank.)

- Minor realignment and widening of _______________, to accommodate the Contractor's operations in the source, are anticipated. Any activity related to the realignment or widening of source access road(s) must be reviewed and approved by the Engineer prior to any work taking place. Routine road maintenance activities such as grading and watering of the source access road(s) will not need prior approval. Perform maintenance of the cattle guard(s) and gates on _______________ as part of the routine maintenance. Maintain or develop drain dips, water bars, road crowning, in-slopes and out-slopes during road maintenance.

(Use the following three bullets on county-owned sources. Fill in the blank or the first bullet with the name of the county. Fill in the blanks of the second bullet with the name of the contact person(s), the county name, and the phone number. Fill in the blank of the third bullet with the royalty fee amount and unit, i.e. m^3, cubic yard, etc.)

- This source is under Agency control through an agreement with the ____________ County Department of Public Works. Operations within this source are subject to all conditions placed on the source by DOGAMI.

- For information contact _____________ or ____________ at the ___________ County Department of Public Works, at ____________, to make arrangements to visit the site.

- A $________ per _________ royalty charge for all material removed from the prospective source will be deducted from monies due the Contractor in the progress payment.

Use the following four bullets on USFS owned and privately owned sources. Fill in the appropriate property owner in the blank of the first and third bullets. Fill in the royalty fee amount and unit in the fourth bullet.)

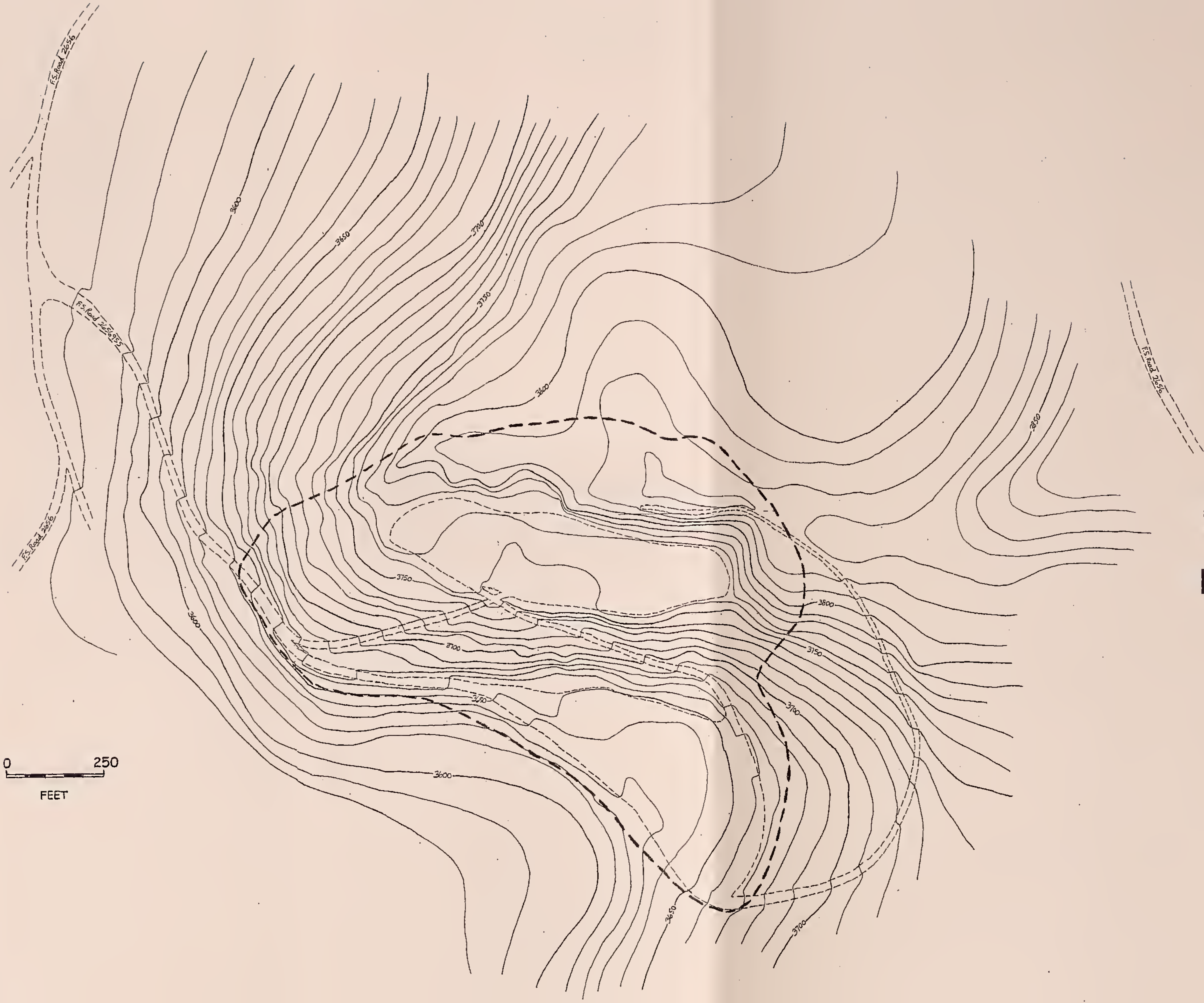
- This source is under Agency control through an agreement the "Contract for Sale of Mineral Material" with ___________________. All Contractor operations shall conform to the requirements of this agreement, the development plan, and these Special Provisions.

- A copy of the Contract for Sale of Mineral Materials for this source is available for inspection at Project Manager's office. The Contractor shall examine and become familiar with it, and shall comply with the stipulations and conditions of the Contract of Sale of Mineral Materials and any attachments.

- The $ ________ per ___________ royalty charge for produced aggregate obtained from the prospective source will be deducted from monies due the Contractor in the next progress payment, based on quantities of produced material.

[End Subsection .40(d)]

Figure 1



N

TAMARACK QUARRY

EXISTING DEVELOPMENT

PLAN VIEW

scale 1:3000
1" = 250'

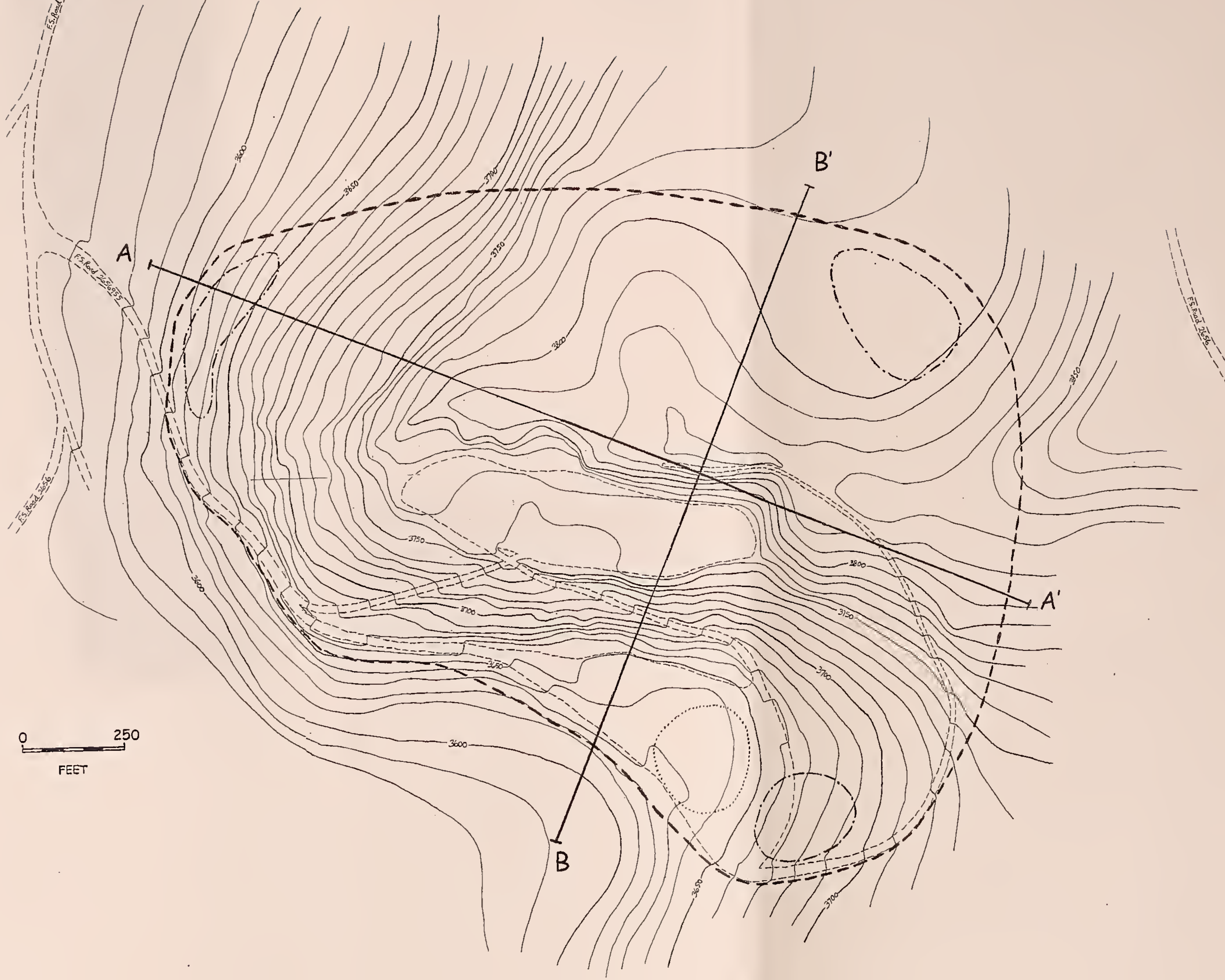
Key

contour line (contour interval = 10 feet)

edge of existing road or operating area

edge of proposed quarry development

Figure 2



TAMARACK QUARRY

PROPOSED DEVELOPMENT

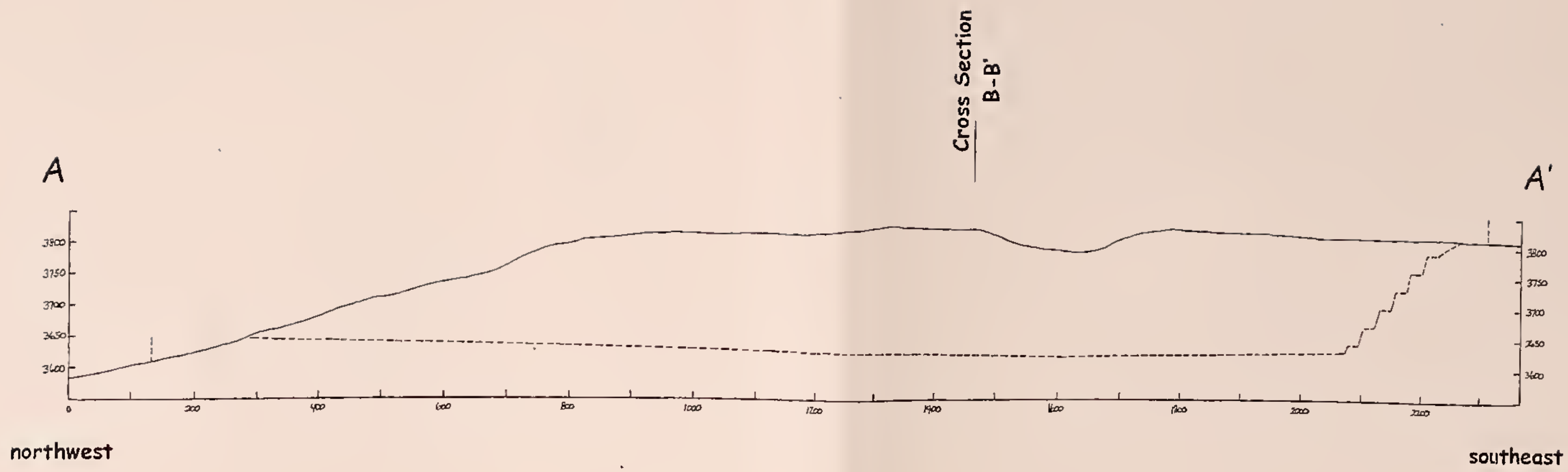
PLAN VIEW

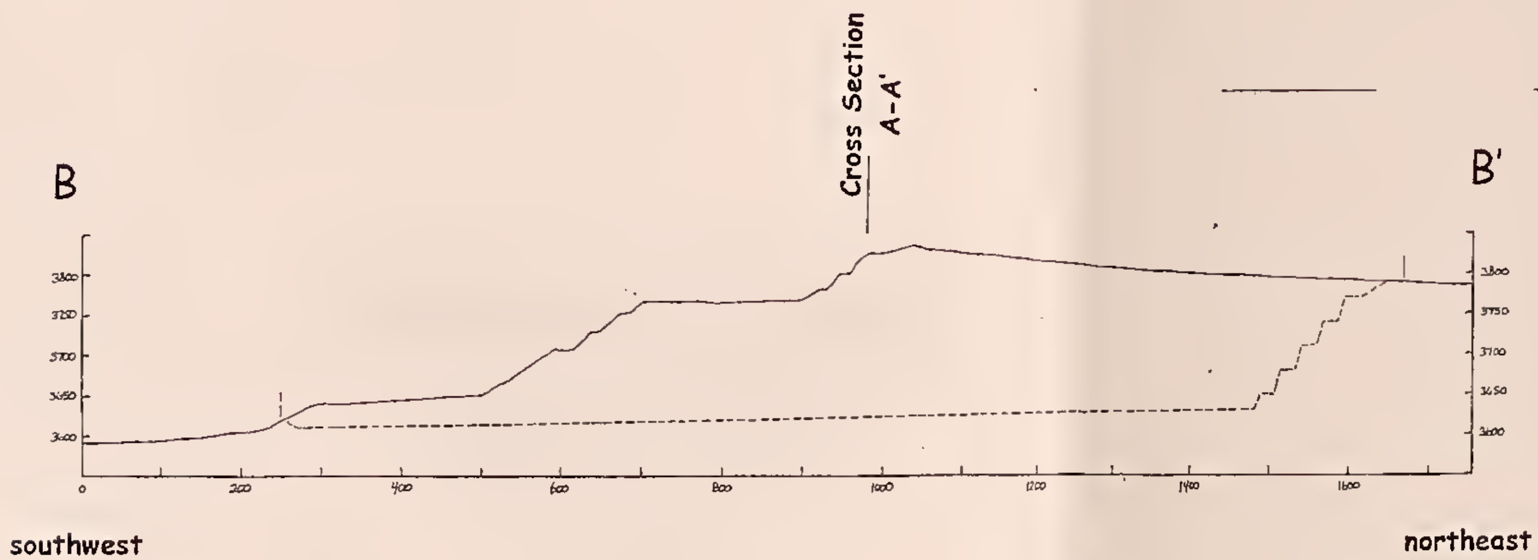
scale 1:3000
1" = 250'

Key

- contour line (contour interval = 10 feet)
- edge of existing road or operating area
- edge of proposed quarry development
- edge of overburden stockpile site (proposed)
- edge of settling pond (proposed)
- end of cross section

Figure 3





TAMARACK QUARRY
PROPOSED DEVELOPMENT

CROSS SECTION VIEW

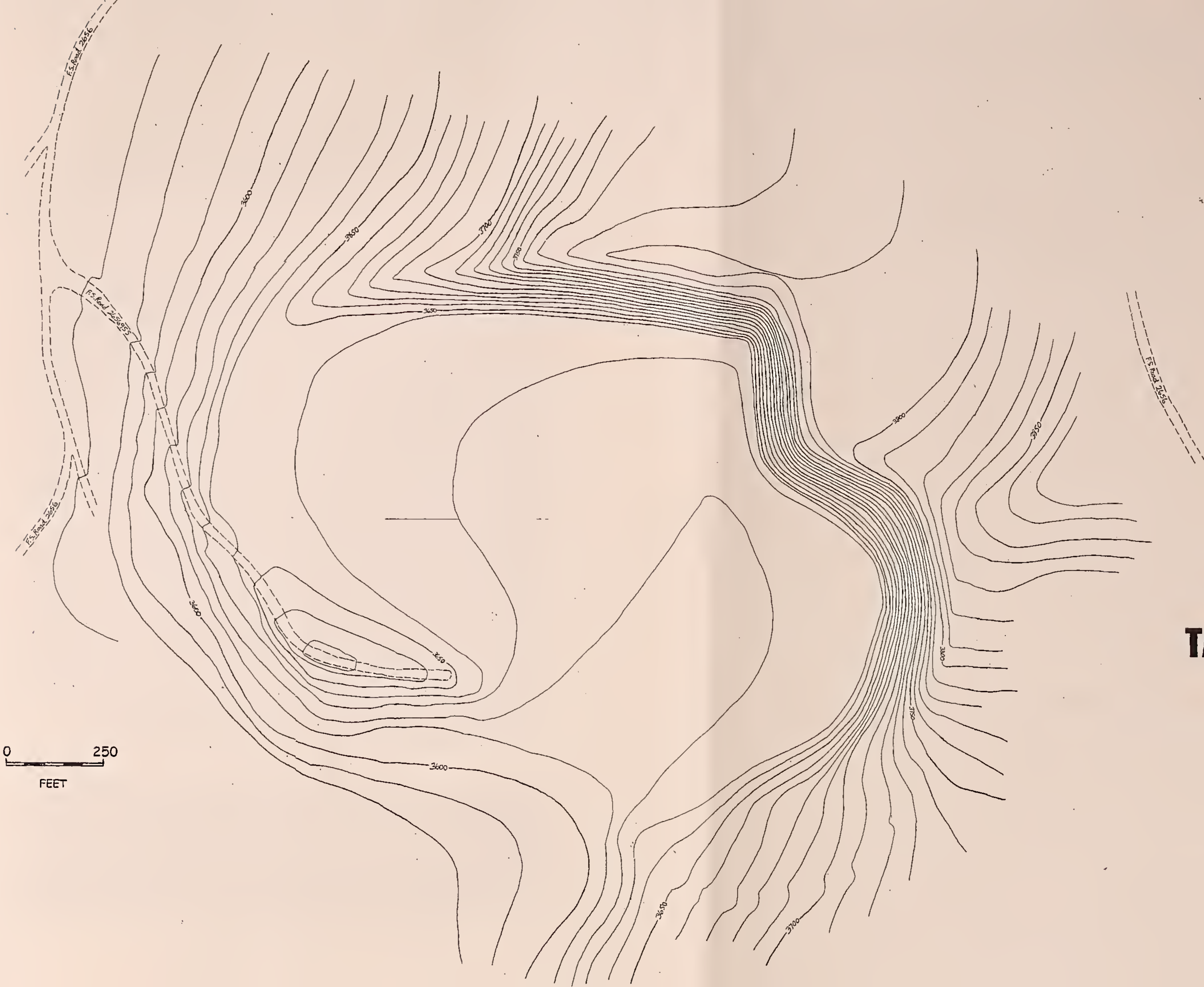
scale 1:3000
1" = 250'

Key

existing ground surface

edge of proposed quarry development

Figure 4



N

TAMARACK QUARRY

FINAL CONTOURS

PLAN VIEW

scale 1:3000
1" = 250'

Key

— contour line (contour interval = 10 feet)

– – edge of existing road

Errata Sheet - Corrects page numbers for Chapters 4-13

Table of Contents

APPENDICES